OCTOBER 1953
PRICE 35 CENTS

ELECTRICAL CONSTRUCTION AND MAINTENANCE

WITH ELECTRICAL CONTRACTING

Winning Entries

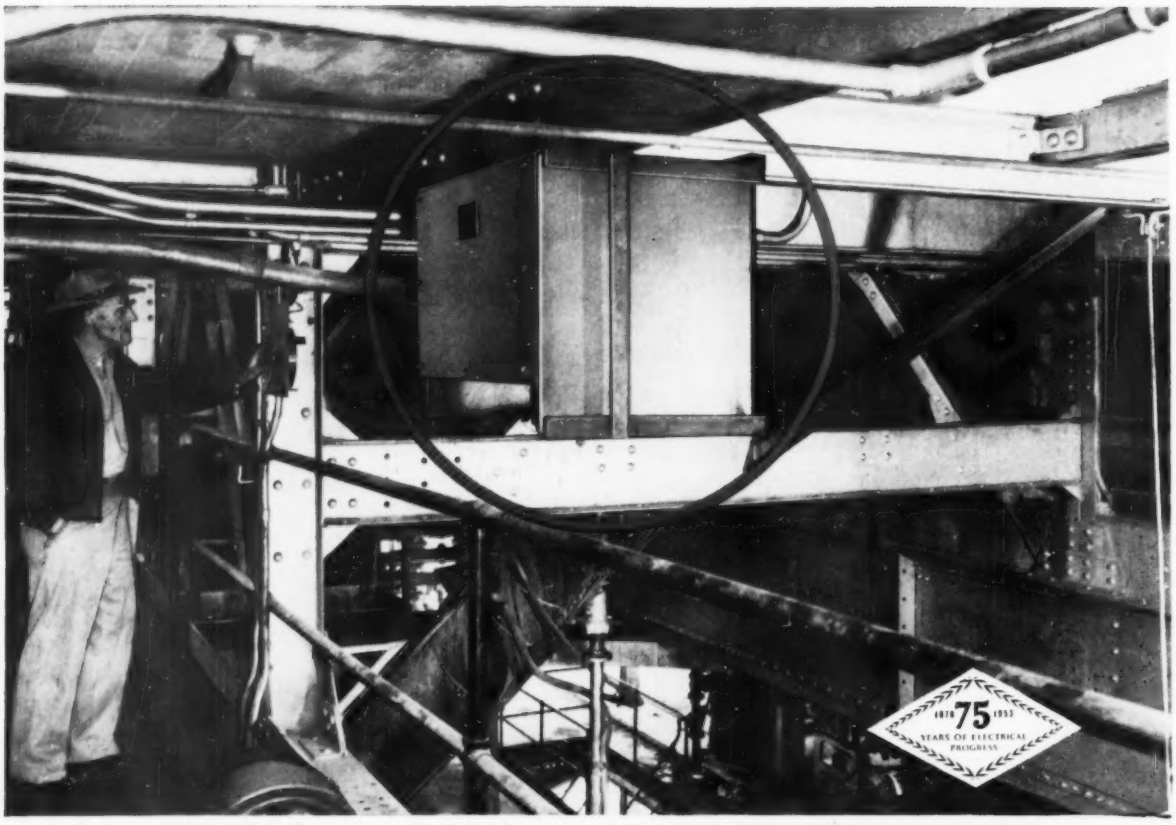
NATIONAL LIGHTING COMPETITION

for Electrical Contractors

A special report complete in this issue

B. A. McDONALD, *Rochester, N.Y., named to head Electrical Inspectors at 25th year joint meeting of IAEI in Chicago.*

A McGRAW-HILL PUBLICATION | 52ND YEAR



60-kvar capacitor unit shown above is part of the 600-kvar installation that permitted a 10% increase in load.

Capacitors can be put in out-of-the-way places—such as on these existing horizontal I-beams to conserve space.

Seriously overloaded circuits take on 10% more load after G-E Capacitors are added

American Crystal Sugar Co. profits from an emergency that arose during a recent sugar refining "campaign."

During a sugar beet "campaign" which lasts from July to December, the American Crystal Sugar Company of Clarksburg, California, operates 24 hours a day. Shutdowns mean costly financial losses.

That's why the company really had an emergency on its hands when its electrical facilities became seriously overloaded in a recent campaign. However, the solution was simple. A call to G.E. brought 600 kvar of capacitors to the plant in time to prevent a "burnout."

A short time after the order was placed, the capacitors were installed and in operation. The plant's power factor climbed from 86% to about 97%. This relieved the overloading—*and released enough capacity to handle a subsequent 10% increase in load!*

CAPACITORS HAVE MANY USES

They can often free distribution facilities to carry 20 to 30% more load. Where voltage drop is a problem, capacitors can provide the needed voltage boost inexpensively. And if your power factor is below 85%, and you have a power-factor or kva-demand clause in your contract, they can usually cut your power costs.

For more information, see your local G-E Apparatus sales office, or authorized G-E agent or distributor. Or write to Section 407-209 for booklet GEA-5632—"How to Reduce Power Costs and Gain System Capacity." *General Electric Company, Schenectady 5, New York.*

You can put your confidence in—

GENERAL ELECTRIC

55 AMPERE CIRCUIT BREAKER SERVICE CONTROL

...ALWAYS CARRIES FULL LOAD

Another NEW Murray Product

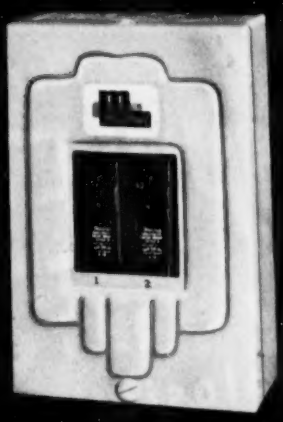
that gives you

Fully Magnetic

circuit protection

Fully Magnetic Circuit Breakers always carry their full rated load—never need derating. The magnetic principle of operation is not affected by changes in temperature.
Murray Breakers give three way circuit protection.

1. Timed delay to carry harmless overloads.
2. Timed tripping on dangerous overloads.
3. Immediate tripping on short circuits.



MANY ADVANTAGES

1. Fully Magnetic Circuit Protection.
2. Solderless connectors, and ample wiring room make it EASY TO INSTALL.
3. Seven concentric KO's—where you need them.
4. Easy to gang (no side handles).
5. Compact 7⅜" x 4⅞" x 3-11-16" (Surface type).
6. Also available in flush.

WHAT IS IT?

Service Control equipment with 55 ampere main capacity and two—50 ampere single pole Fully Magnetic Circuit Breakers. Supplied with handle extension for simultaneous manual tripping. Available in surface or flush. Listed by Underwriters' Laboratories, Inc.

HOW IS IT USED?

1. **In place of a comparable 60 ampere fused switch.**
2. **As service entrance equipment.**
3. **As a main disconnect.**
4. **For protecting single phase lighting and appliance circuits or for fractional horse power motor circuits.**
5. **For protecting electric range circuits.**
6. **For use on 2 wire, 250 volt service without neutral or; 3 wire 125-250 volt wiring with neutral or 2 wire 125 volt with neutral.**

IS IT AVAILABLE?

YES—immediate shipment—see your electrical distributor or write the factory—specify catalog number LC002H.

One Of The Family

Another addition to Murray's growing Circuit Breaker equipment line. Others include—The 2 circuit 40 amp and 100 amp, the "6", the "8", the "12" and the "20" Circuit Protectors. Panel boards up to 42 branch circuits.

50 YEARS OF SERVICE TO THE ELECTRICAL INDUSTRY

For detailed information, write:

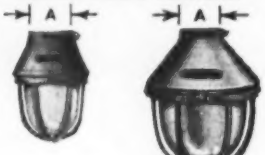
MURRAY MANUFACTURING CORPORATION
1250 ATLANTIC AVENUE · BROOKLYN 16, N.Y.

Service Entrance & Meter Equipment - Magnetic Circuit Breakers - Switches - Current Limiting Reactors - 'Crows' Nest Aerial Ladders

Relamp or Convert to Higher Wattages in **SECONDS...**

with APPLETON vented Explosion-Proof Fixtures

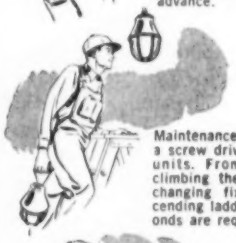
APPLETON INTERCHANGEABLE UNILET BODY FEATURE



Note how identical diameters "A" at top of Dome Unit Assembly permit mounting of all fixtures regardless of wattage.

58 SECOND RELAMPING

When the call comes for relamping, AA-51 Series STAND-BY Units are ready at an instant's notice. Carrying handles can be attached in advance.



Maintenance man needs only a screw driver to exchange units. From the time of climbing the ladder to exchanging fixture and descending ladder, only 58 seconds are required.

Burned out lamps and cleaning fixture are safely attended to at the work bench, while production schedules are maintained.

Standardized Unilet Body Permits 58 Second Interchange of 60 Watt to 500 Watt Fixtures . . . Saves Time, Prevents Shutdowns! All of your customers, in whose plants there are hazardous areas, will appreciate you telling them about *Appleton* AA-51 Series Vented Explosion-Proof Fixtures.

No other similar units have so many exclusive features . . . offer so much. In fact, less efficient units now in use cost your customers real money, in many ways, each day they remain in service.

Appleton AA-51 Series meet all Underwriters' Laboratories requirements for Class I, Groups *C* and *D* Hazardous Locations.

Here is a genuine profit opportunity for you! Write for Full Details, Today!

- **"FLAME-TIGHT" CONTACT CHAMBER**
  Because of *Appleton's* exclusive "5-Thread Safety Chamber" any AA-51 Series Unit can be serviced with complete safety even if current is inadvertently left on!
- **"FULL-CIRCLE" VENTING**
  The notched globe ring and the porous metal interior dissipate heat evenly and safely and keep fixture temperature cool enough to prevent igniting explosive gases.
- **"STAND-BY" SYSTEM SAVES MONEY**
  For every ten AA-51 Units in operation *Appleton* recommends one unit as a stand-by . . . ready for relamping or wattage conversion in 58 seconds.

SOLD THROUGH ELECTRICAL WHOLESALERS

APPLETON ELECTRIC COMPANY
1704 Wellington Avenue • Chicago 13, Illinois

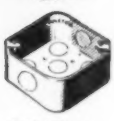
APPLETON ELECTRIC PRODUCTS — REG. U.S. PAT. OFF.

Also Manufacturers of:

Malleable Iron Unilet Fittings

Industrial Lights

"ST" Series Connectors



Outlet Boxes

Published for electrical contractors, industrial electricians, engineers, consultants, inspectors and motor shops. Covering engineering, installation, repair, maintenance and management, in the field of electrical construction and maintenance.

ELECTRICAL CONSTRUCTION AND MAINTENANCE

with which is consolidated Electrical Contracting, The Electragist and Electrical Record . . . Established 1901

52nd Year OCTOBER • 1953

MORE

OCTOBER • 1953 *continued*

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OCTOBER 1953 • Vol. 52, No. 10

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Original and Genuine

RIDGID

HEAVY-DUTY PIPE WRENCH

Read this guarantee —on millions of RIDGID wrenches sold to date.

1st with guaranteed housing— still the only one!

★ UNCONDITIONAL GUARANTEE

If this Housing ever Breaks or Distorts we will replace it Free.

COPR. 1937
THE RIDGE TOOL CO.
ELYRIA, O.

1st *with replaceable jaws*—non-slip, non-lock, instant grip on pipe.

1st *with adjusting nut in open housing*—always spins easily to conduit size, 6″ to 60″.

1st *with handy pipe or conduit scale* on hookjaw.

1st *with comfort-grip I-beam handle*—with handy hang-up hole.

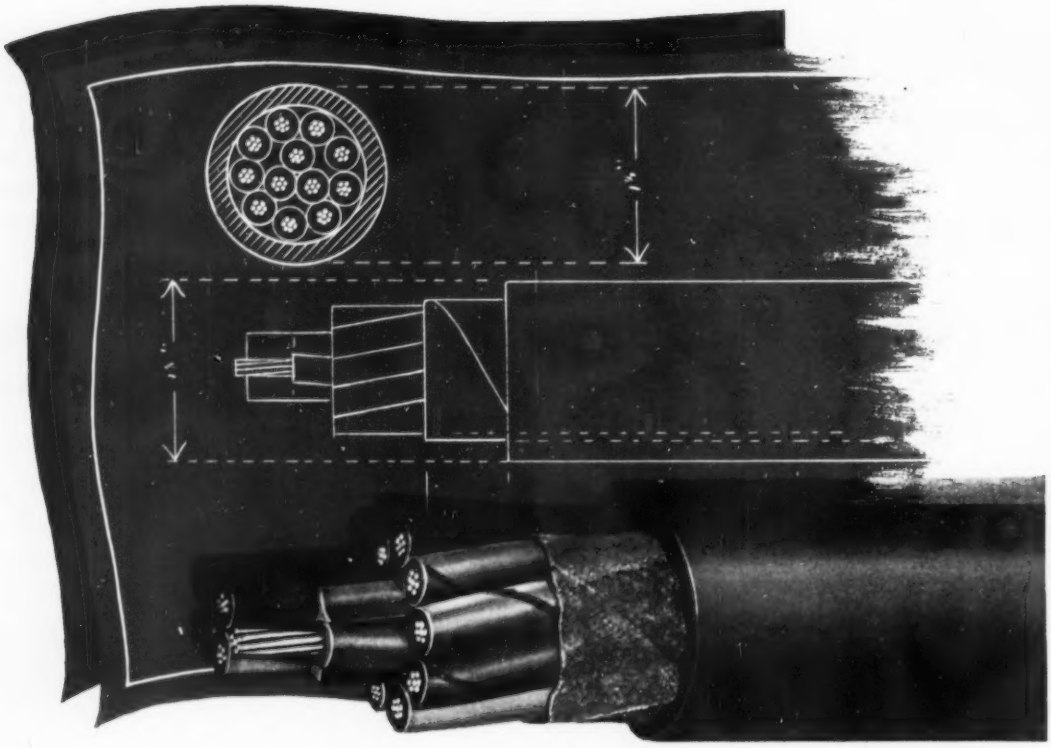
1st *with end pattern pipe wrench*—for conduit crowded or against flat surfaces.

No wonder RIDGID is the world's most popular pipe wrench. Buy genuine RIDGID 's for easier work and extra economy—at your Supply House.

THE RIDGE TOOL COMPANY, ELYRIA, OHIO, U. S. A.

RIDGID

Work-Saver Pipe Tools -- Most Popular in the World



WATERTITE-HAZAPRENE CONTROL CABLE

DESIGN DOESN'T COST...IT PAYS

Good design is just about all that matters in control cables. If you start with good design it will pay off in dependability, long service life and economy.

Watertite-Hazaprene control cables are designed with the following features:

SHEATH: Tire-tough Hazaprene ZBF: neoprene compounded to Hazard's exclusive formula. Offers superior resistance to flame, oil, acid, moisture, sunlight and mechanical damage. Pressure-vulcanized in a continuous metal mold for a smooth, dense surface that resists abrasion and tearing.

INSULATION: Long-lived Watertite, a firm, electrically stable, rubber insulation that resists moisture and heat, prevents deformation.

FILLERS: Rubber, to prevent the wicking-in of moisture and to add firmness to the construction.

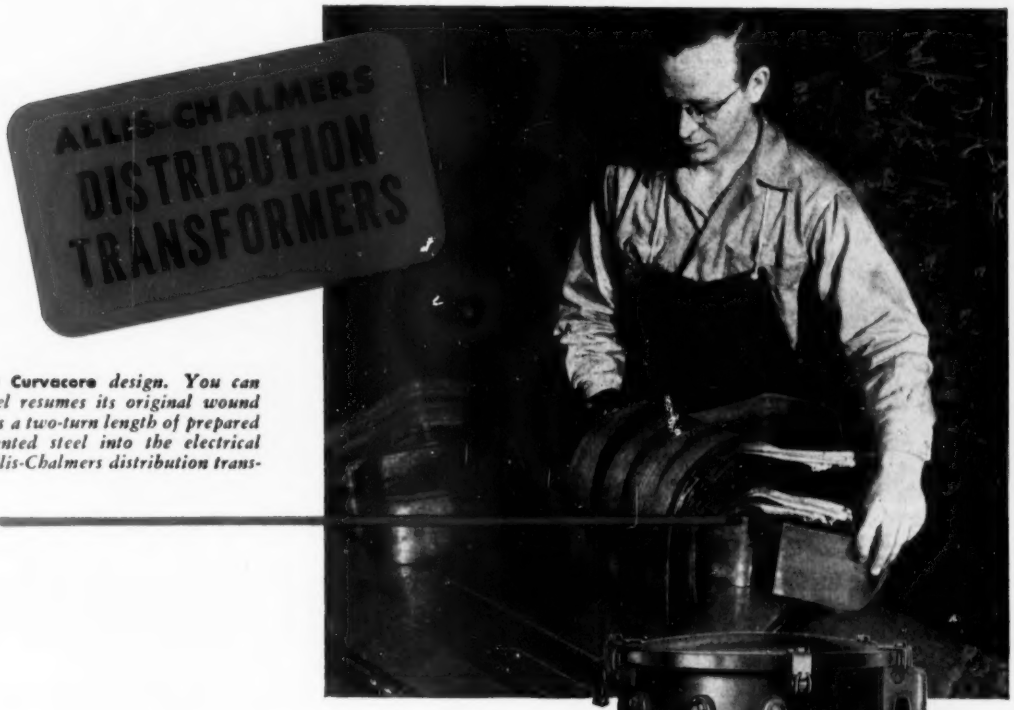
CONDUCTORS: Strong and flexible; tin coated to resist corrosion.

There's a Watertite-Hazaprene cable for every control circuit requirement. See your Hazard representative or write for complete information. Hazard Insulated Wire Works, Division of The Okonite Company, Wilkes-Barre, Pennsylvania.

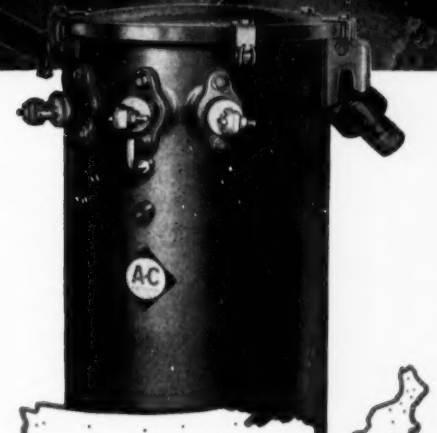
HAZARD insulated cables

1650

How CURVACORE Design Improves Transformer Performance



Picture illustrates **Curvacore** *design. You can see how core steel resumes its original wound shape as man feeds a two-turn length of prepared cold-rolled, oriented steel into the electrical windings of an Allis-Chalmers distribution transformer.*



Results in Low Exciting Current . . . Low Losses

Curvacore design fully utilizes the advantages of cold-rolled, oriented steel. First, steel is wound from a continuous strip of steel, shaped and annealed. The annealing process relieves mechanical stresses and sets the shape of the core. Then core steel is unwound, cut into two-turn lengths and nested in proper order for assembly around the coils.

Curvacore design permits the flux path to follow the grain of the steel. This results in high permeability, low hysteresis losses and a mechanically stronger core structure of less weight than previous design.

Better Regulation and Cooling

In addition, coils are arranged in low-high-low sequence which gives lower impedance resulting in better regulation characteristics. Liberal cooling ducts provide large contact areas between windings and oil to keep copper-to-oil gradient low.

As a result of careful design and manufacture, you get a compact, efficient transformer. And you get extra features like improved impulse strength, sealed tank construction, and excellent surface protection. For complete details, call your nearby A-C district office or write Allis-Chalmers, Milwaukee 1, Wisconsin.

A-4099

Curvacore is an Allis-Chalmers trademark.

ALLIS-CHALMERS

ONLY UNDER DIRECT FLAME, will GE's new self-extinguishing insulation for metal-clad switchgear char—as demonstrated in this picture with flame of blow-torch applied directly to the new laminated sheet-type insulation.

GE's "self-extinguishing" insulation gives

New sheet-type material with exclusive, flame-retardant feature localizes damage that may occur under abnormal conditions

The equivalent of a "built-in fire extinguisher"—a flame-retardant insulation for switchgear, marks the most recent General Electric development for even safer, more dependable metal-clad switchgear—industry's standard for 2400- to 13,800-volt circuits.

In introducing this flame-retardant insulation—which was perfected by Nicholas F. Arone, engineer in its Switchgear Department in Philadelphia—G.E. has gone far to minimize all potential fire hazards in switchgear.

All good insulating material has three standard properties: high mechanical strength, high dielectric strength, and a non-hygroscopic quality. To this group, G.E. is the first to add an important fourth property: a self-extinguishing characteristic that *refuses to sustain combustion.*

The laminated insulation sheet will burn and char—but *only* if an outside source of flame remains in contact with the sheet itself. Once the source is removed, polyvinylchlorides "smother" the flame in less than a minute—localize damage—and permit quick access to compartments for inspection and maintenance.

In bus and cable supports, in insulating barriers between compartments, in box barriers for arc chutes—throughout vital spots of metal-clad, GE's new flame-retardant insulation works for greater protection under *all* conditions—without extra cost to you.

For information on improved Metal-Clad Switchgear, with new, flame-retardant insulation, call your nearest G-E sales representative, or write to General Electric Company, Schenectady 5, N. Y. 874-3

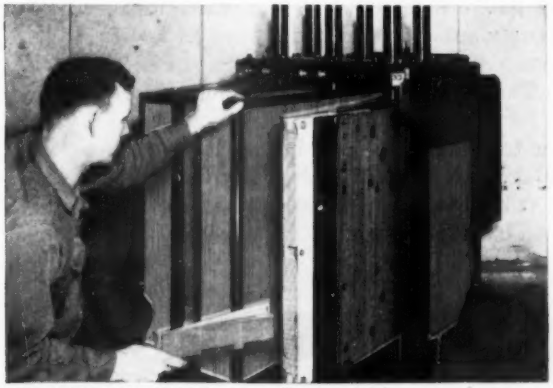
G. E. BURENS, *general manager, Switchgear and Control Division, presents Coffin Award to N. F. Arone for developments of outstanding new insulation. Coffin Award is General Electric's highest employee honor.*

GENERAL ELECTRIC

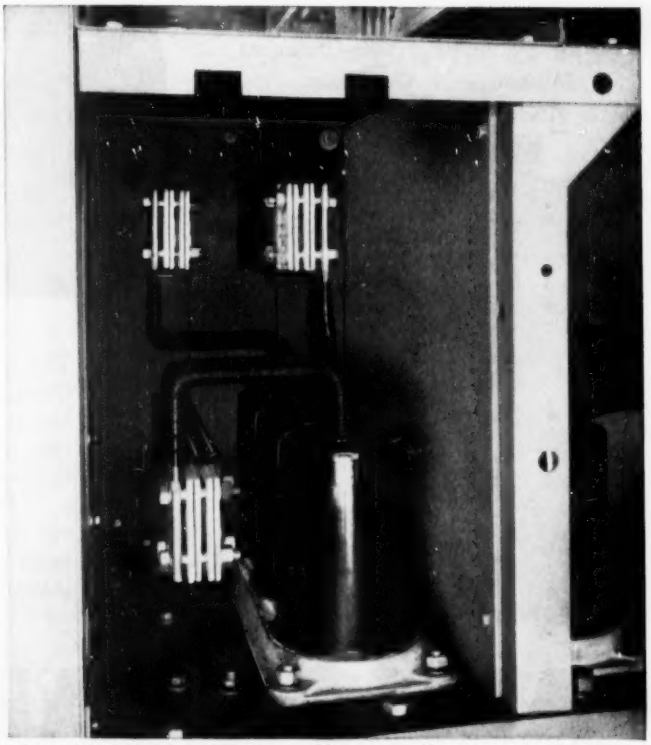
WITH FLAME REMOVED, the flame-retardant insulation refuses to sustain combustion—and extinguishes itself in less than 60 seconds. Polyvinyl-chlorides in the laminated sheet "smother" the flame, permitting ready access to compartments for inspection and maintenance.

added protection to metal-clad switchgear

THIS METAL-CLAD SWITCHGEAR lineup features GE's new flame-retardant insulation at vital points throughout all sections.



INSULATING BARRIERS for arc chutes are flame-retardant, non-hygroscopic, possess high mechanical and dielectric strength.



COMPARTMENTIZED SECTIONS, in addition to self-extinguishing insulation as shown in this bus section, limit damage from abnormal conditions.

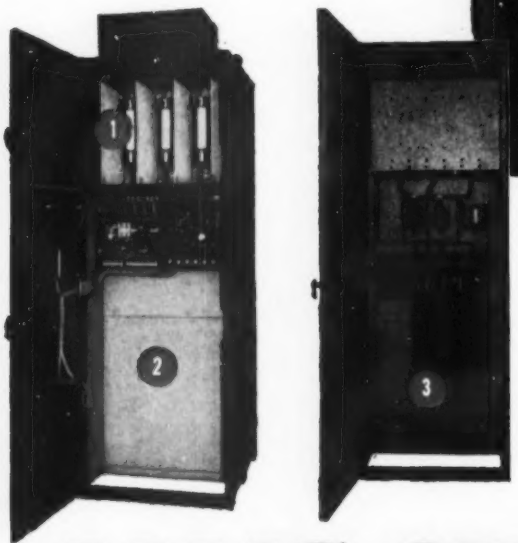
Personnel Protection

ALLIS-CHALMERS
Type H Starters
FOR 2300 TO 5000 VOLT MOTORS

THROUGH SEGREGATED HIGH VOLTAGE COMPARTMENTS

For positive personnel protection, high voltages are completely segregated in the Allis-Chalmers Type H starter. Full width, heavy sheet steel barriers separate the front low voltage compartment from the rear high voltage equipment and from the upper fuse compartment. It will pay you to get all the details from your nearby A-C representative or by writing Allis-Chalmers, Milwaukee 1, Wisconsin.

Current limiting fuses are easily removed with hook stick. Safety door interlocks take motor off line when fuse compartment door is opened.



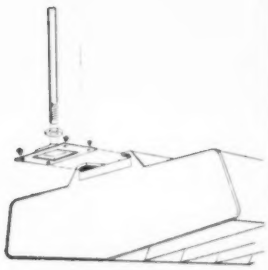
3 Compartments Assure Safety

The heavy gauge steel cubicle is divided into three compartments for maximum safety. **1** — Upper front compartment encloses disconnect type fuse. The same operation which puts fuse in position for removal isolates starter from line. **2** — Lower front compartment houses low voltage control devices. **3** — Rear compartment contains high voltage equipment, contactors, buses, instruments, transformers, etc.

A-4002

ALLIS-CHALMERS

a beautiful new luminaire with full length luminous plastic side panels — and sliding stem plates to simplify mounting.



No opaque metal frames mar the beauty of the Cavalier's luminous plastic side panels. Yet the construction is sound and sturdy, for inside is a supporting steel frame which also acts as an internal reflector.

But there's more than beauty to recommend this entirely new luminaire. There's a wonderfully ingenious sliding stem plate which can be moved from end to end to support the Cavalier at any point, completely eliminating problems of in-line spacing of mounting points. Together with adjustable ceiling straps and hook-on stems, this new feature greatly simplifies the installer's job.

NOW CONSIDER A FEW OTHER GOOD POINTS:

1 A special low brightness finish on louvers, side reflectors and channels keeps brightness contrasts down.

2 Equipped for Rapid Start or Slimline lamps. Two models, the Cavalier II (two lamps) and the Cavalier IV (four lamps).

3 Louvers are released by press buttons and suspend on chains.

4 Snap-on end plates with each body —no extra set of end plates to be ordered.

5 Can be ceiling-mounted without extra fittings.

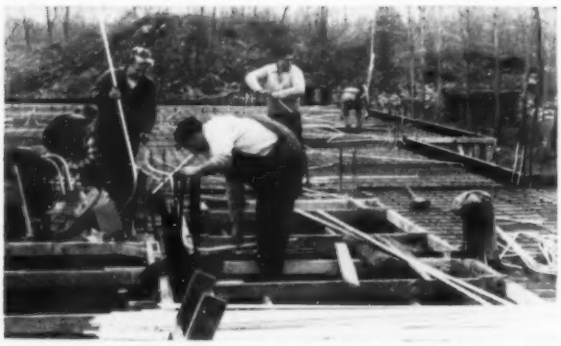
6 8-foot channels for minimum suspension points.

For the complete story of this beautiful new streamlined direct-indirect luminaire, write for an 8-page 3-color folder. The F. W. Wakefield Brass Company, Vermilion, Ohio. In Canada, Wakefield Lighting Ltd., London, Ont.

Wakefield Over-ALL Lighting

Bridgeport, Conn., Project Uses

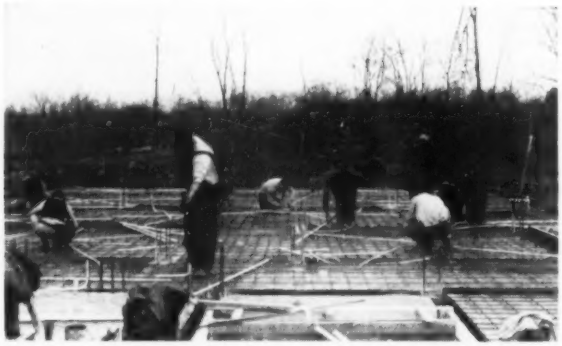
Delays on a project like Bridgeport can be costly. Penalties are high. Using ELECTRUNITE E.M.T., which can be installed easily and quickly, helps keep buildings on schedule.



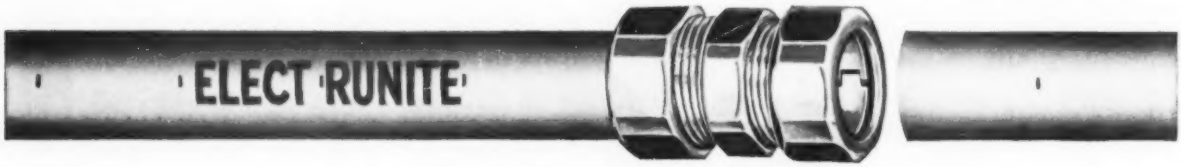
There's no time wasted threading . . . either on the job, or in the shop . . . when you use Republic ELECTRUNITE E.M.T. Instead, journeymen make tight joints using threadless connectors and couplings.

ELECTRUNITE E.M.T. is easier to install in crowded quarters because there are no lines to turn. Advantages are many on concrete jobs like this one.

In bad weather, bends can be easily pre-fabricated in the shop. On good days, lightweight ELECTRUNITE E.M.T. can be bent right on the job, using the Republic bender. You can get valuable hints from "The Bending System." Write for your copy.

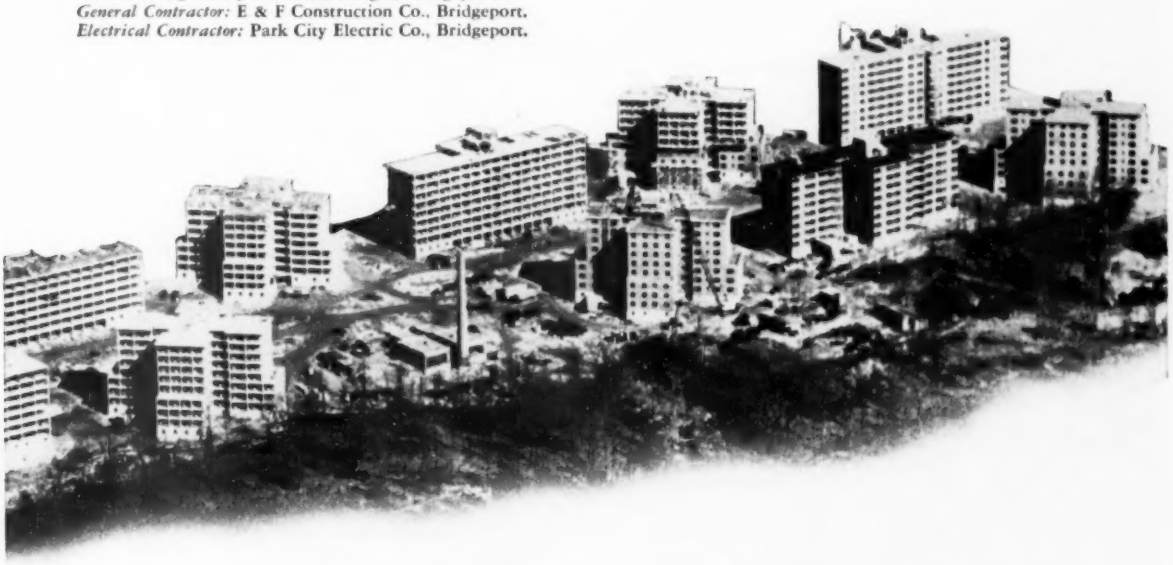


On good days, bending can be done quickly, and accurately on the deck with "Inch-Marked™" ELECTRUNITE E.M.T. using the Republic bender. All it takes to make tight joints is two wrenches. No threading.



Over 500,000 feet of Republic ELECTRUNITE E·M·T·

Beardsley Park Terrace Housing Project, Bridgeport, Conn.
Architects: Lindsay & Johnson, Bridgeport.
Electrical Engineer: John Shallenberger, Bridgeport.
General Contractor: E & F Construction Co., Bridgeport.
Electrical Contractor: Park City Electric Co., Bridgeport.

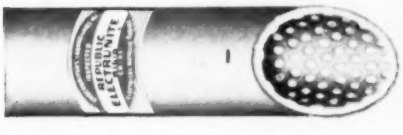


● When a contractor uses that much Republic ELECTRUNITE® E.M.T. you can be sure he has good reasons. One of them is the fact that it goes in easily and quickly, helps keep building schedules on time. And where penalties are high, that's especially important.

Journeymen like to work with ELECTRUNITE E.M.T. It's lightweight, easy to handle. Cuts easily, too, and accurately, because it's "Inch-Marked®". And smooth, accurate bends can be made with the Republic bender, when instructions are followed.

Republic ELECTRUNITE E.M.T. is approved by the National Electrical Code for exposed, concealed and concrete slab construction. And by Underwriter's Laboratories. Get all the facts and you'll get this easy-to-install electrical raceway for your next job. It pays. For more facts, write for free booklet.

STEEL AND TUBES DIVISION
REPUBLIC STEEL CORPORATION
212 EAST 131ST STREET • CLEVELAND 8, OHIO
Export Department: Chrysler Building, New York 17, N.Y.



Republic
REPUBLIC STEEL
ELECTRUNITE E.M.T.

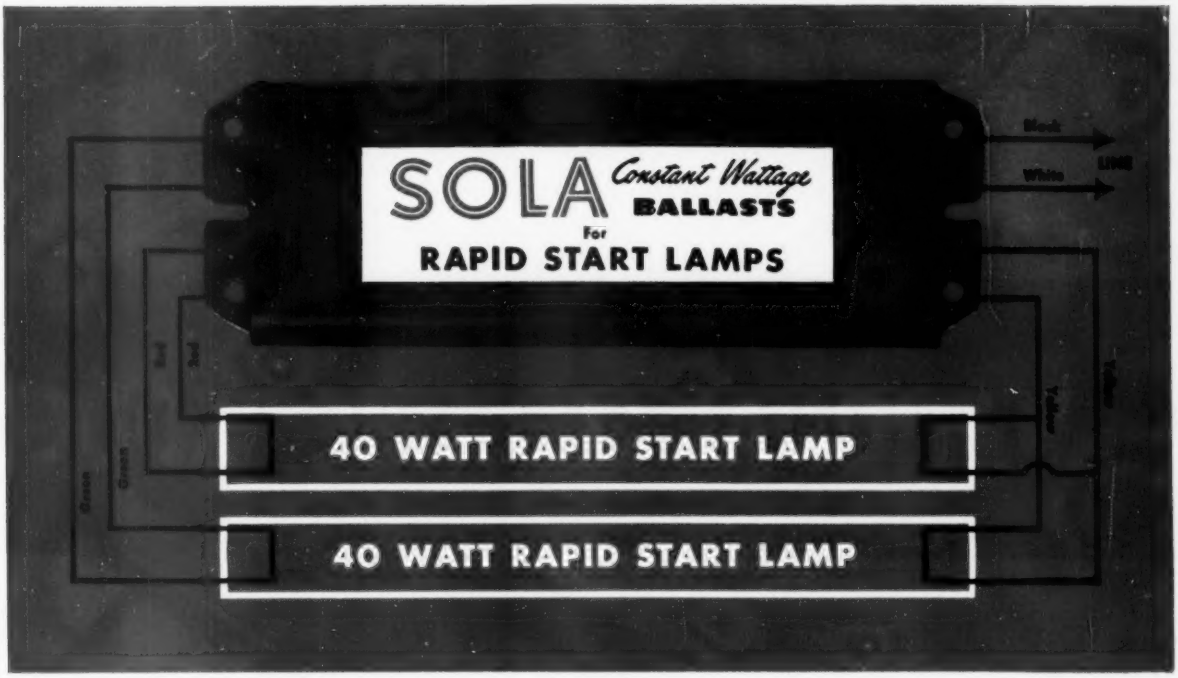
Remember that Red Hot 1949 Briegel Combination Indenter and Fitting Deal? It broke all records then so here we go again!

For three months only, August, September and October, a Special Package Offer of 200-½" B. M. Couplings and 400-½" B. M. Connectors. Free of extra cost in this package will be 1 No. 606 Briegel ½" Indenter!

Stock up today with this Deal that sold out the last time it was offered.

BRIEGEL METHOD TOOL CO.

GALVA • ILLINOIS



Here is *the lighting system* that automatically, unfailingly

maintains the performance you specify

The rapid start lamp and the Sola Constant Wattage Ballast together form the heart of an entirely new fluorescent lighting system. All the inherent advantages of the rapid start lamp are enhanced when operated from a Sola Constant Wattage Ballast regardless of line voltage conditions. This is the finest ballast that Sola Electric Co. engineers have ever created, and they have introduced a notable number of ballast "firsts." Here is a unique lighting system resulting in performance that is unsurpassed from any point of view. Check the list below. Compare and you will specify Sola Constant Wattage Ballasts for your rapid start lamp installations.

USERS:

Accelerated life tests indicate exceptionally long lamp life relatively unaffected by the number of starts . . . radio interference suppressed . . . completely safe during lamp changes . . . unusually quiet . . . positive light upon closing switch.

ARCHITECTS:

Constant light output within ±2.5%, with line voltage variations as great as ±10% . . . cooler operation (average heat rise 50°C) for reduced air conditioning load . . . UL listed . . . meets proposed Certified Ballast Manufacturer's specifications and every suggested requirement of major lamp manufacturers.

FIXTURE MANUFACTURERS:

Lower initial costs compared with instant start . . . simplified wiring . . . permits use of conventional bi-pin lamp holders with absolute safety since the circuit of the ballast is self protecting against shock hazard . . . series type circuit which has been recommended for rapid start lamps by major lamp manufacturers.

CONTRACTORS:

Only two wires, directly from the ballast, to connect on the line, no wiring to lamp sockets . . . ballast has extremely long life since it is very cool in operation . . . self protecting under abnormal conditions, when lamp failure occurs the ballast actually runs cooler, not hotter . . . gives your customer *all* the light he pays for because of constant wattage feature.

SOLA *Fluorescent* BALLASTS

WRITE FOR RAPID START BALLAST BULLETIN J-PFL-167. If you want more information, write or phone the nearest Sola office listed below.

Transformers for: Constant Voltage • Fluorescent Lighting • Cold Cathode Lighting • Mercury Vapor Lighting • Luminous Tube Signs
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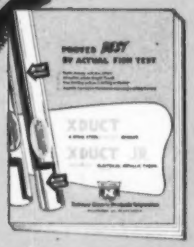

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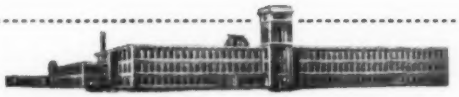

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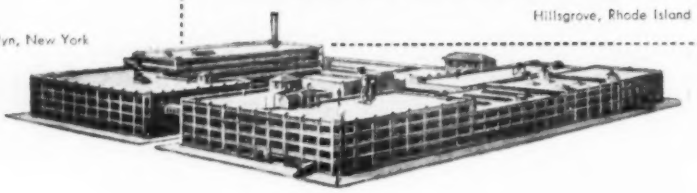

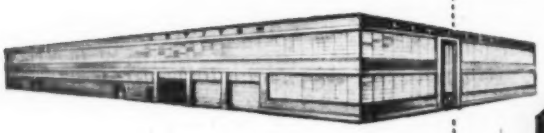

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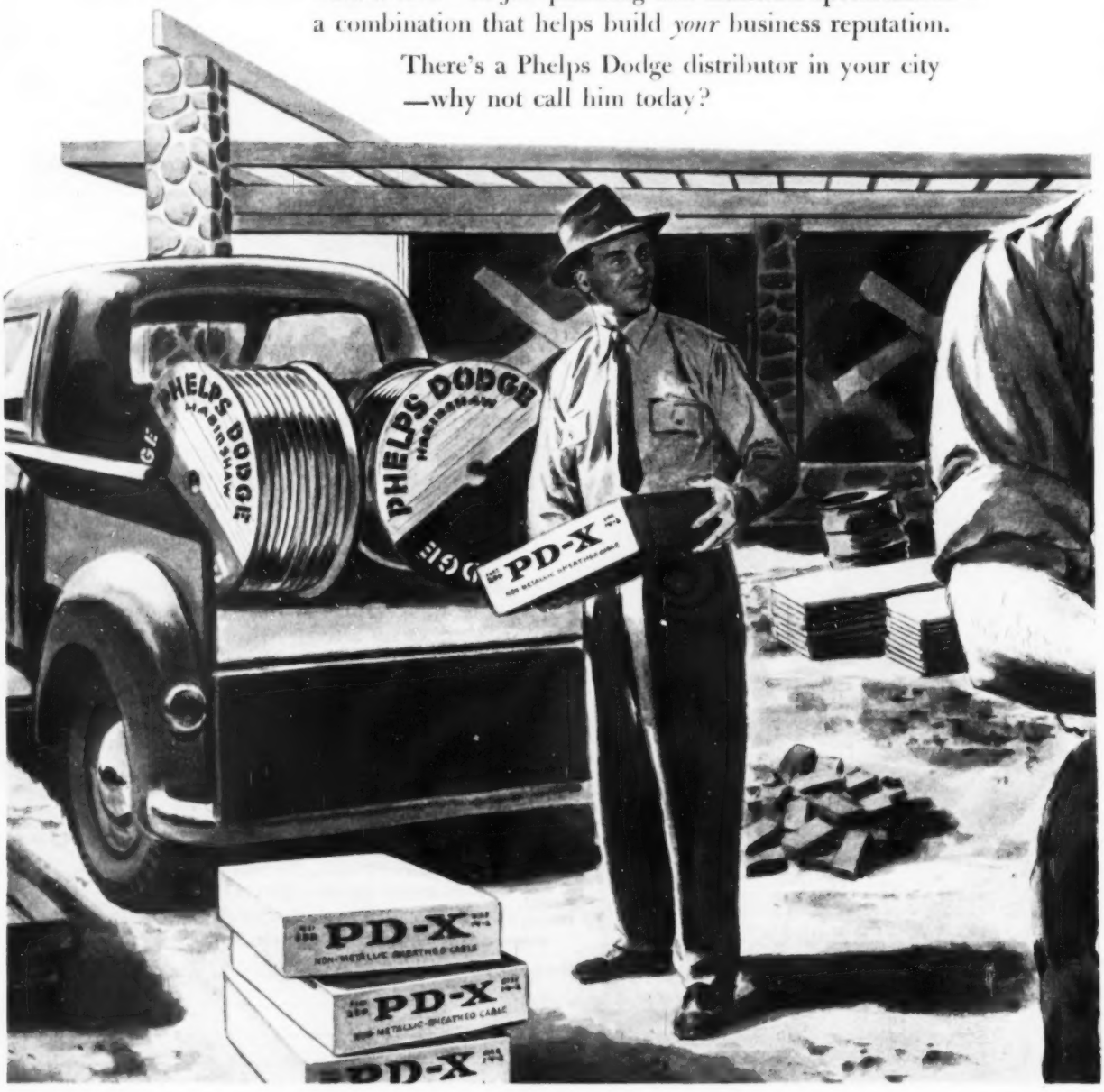

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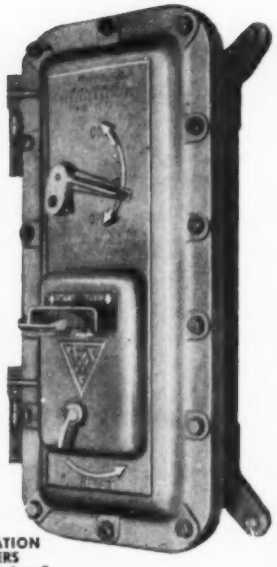

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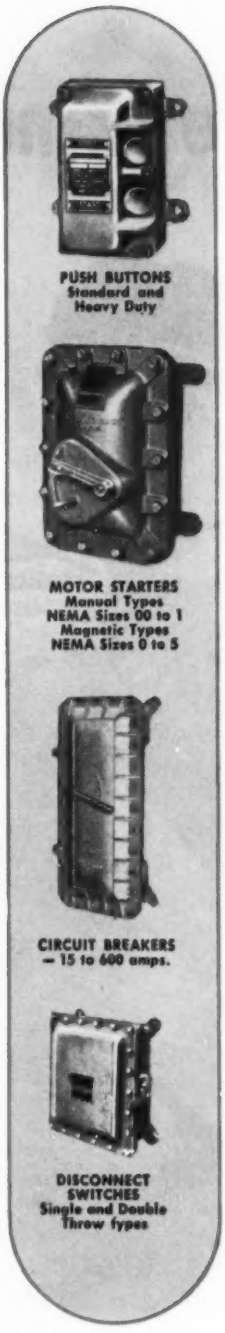

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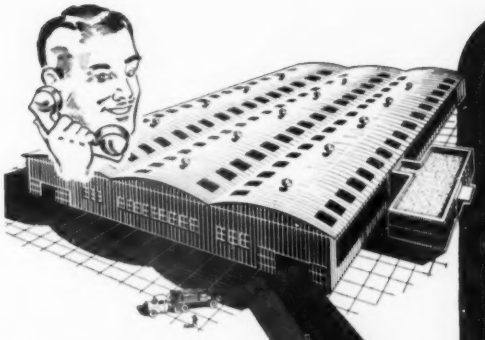

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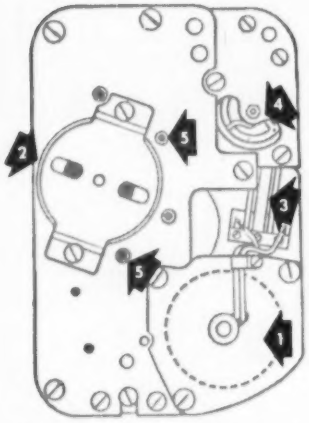
When you install a time switch in a remote or hard-to-reach location—your best buy is a Sangamo Type W—the synchronous carryover time switch. Type W never requires re-setting after a power failure, unless the power is off for 10 hours or more. You don't even have to rewind the mainspring of the carryover mechanism—it's *entirely* automatic.

Think of the unnecessary service calls that you've been making after power outages—and choose a Sangamo Type W Time Switch for your next "hard to get to" installation. It will save you time and money.



Back view of Type W operating mechanism, with dust cover removed.

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There's inherent protection against trouble in all Sangamo Time Switches. The *slow* speed motor . . . The heavy-silver contacts . . . The overall built-in *values* of Sangamo Switches provide protection against ordinary trouble. When you add the protection against outages that the Type W affords—you've got a sure winner.

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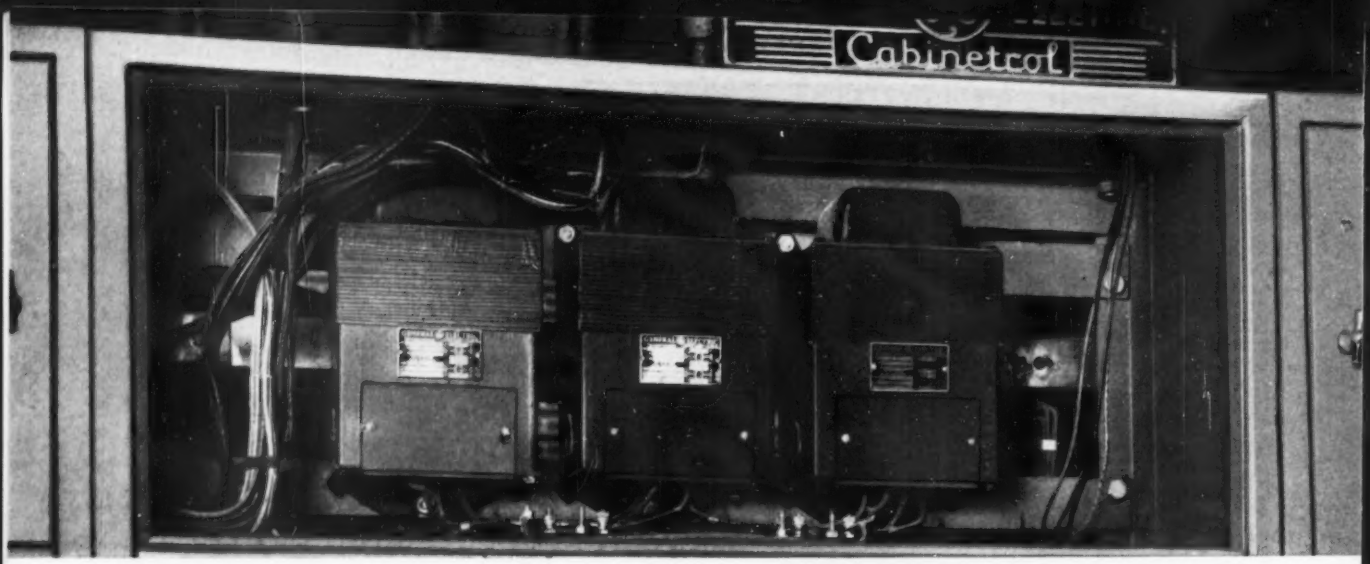

PULP AND PAPER INDUSTRY. Macon Kraft Mill, Macon, Georgia, cuts power waste with G-E dry-type transformers at the load. Here, three G-E Type M's step down 440 volts to 110 volts for G-E Cabinetrol*.

G-E dry-type transformers at the load cut power waste for these three plants

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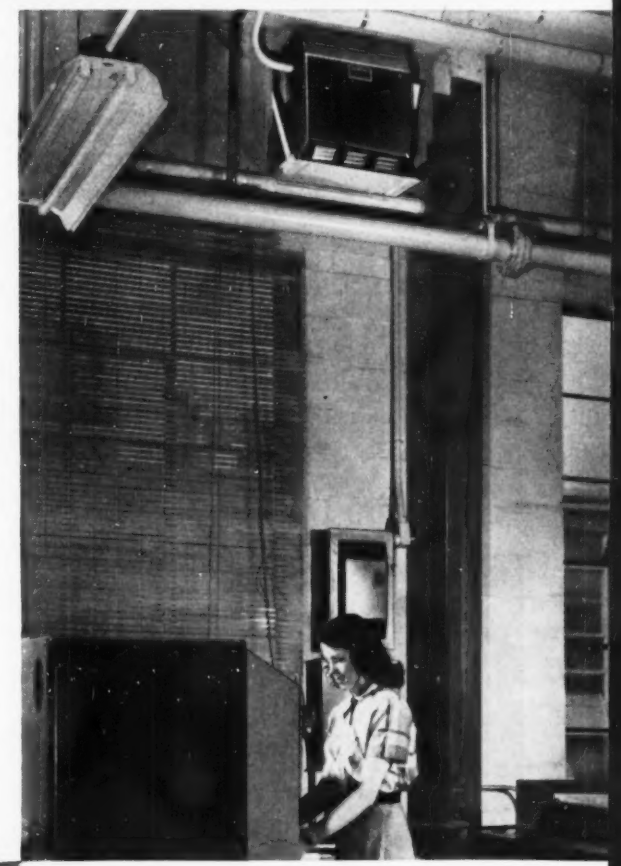

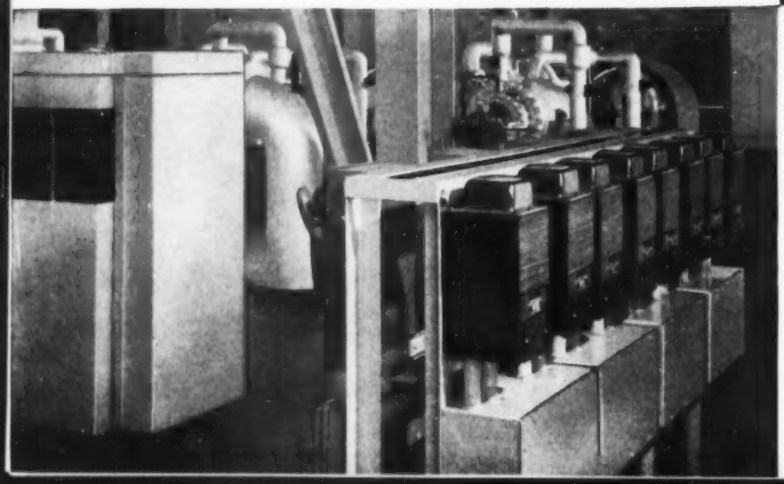

ABRASIVES INDUSTRY. Behr-Manning Company's plant in Troy, N. Y., saves with G-E dry-types. This Type D, platform-mounted on wall, above, steps down 480 volts to 120 volts for blueprint machine and fluorescent lighting. Type D's, for indoor use, are rated 25 kva and up.

UTILITY. Potomac Electric Power Company's Benning Station, Washington, D.C., uses bank of 8 G-E Type M transformers to step down 2400 volts to 480 volts to power coal feeders for turbine installation. Type M's, for indoor and outdoor use, are rated .25 kva to 15 kva.

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T Rated flush toggle switch. Rugged construction. Box screws in ears make it cheaper to install. Cheaper to wire. Wide ears are scored—may be removed. Meets all government specifications. 5A.-250V., 10A.-125V. T

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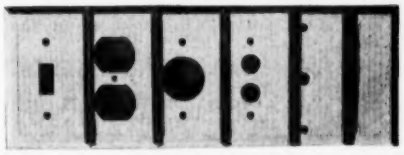

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The Penn-Union Connector is *definitely stronger than all others except one, which closely follows Penn-Union design and is nearly equal.*

Excepting this one similar fitting, the Penn-Union Connector withstands clamping pressures 15% to 55% higher.

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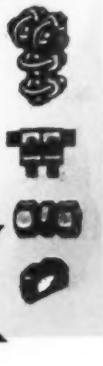
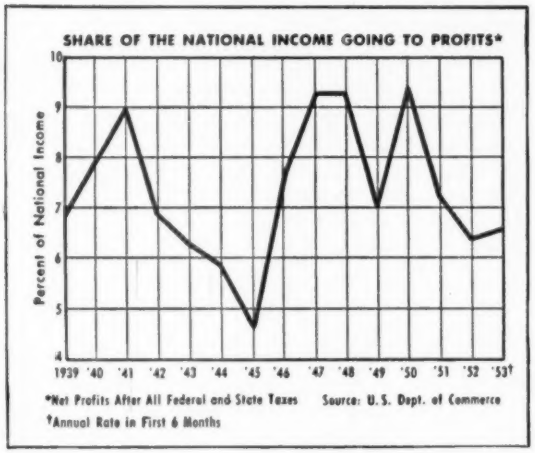


PENN-UNION

The first of two articles on profits

PROFITS...How High Are They?



How high are profits? What is being done with them? This is the first of two articles designed solely to throw some factual light on these key economic questions.

One of the important economic developments of 1953 has been a substantial increase in the dollar volume of corporation profits from the level of 1952. But to answer the question "How high are profits?" we must also measure them: 1) by comparison with the record of previous years, and 2) as a share of the total national income. The term "profits," as used here, refers to profits *after taxes*. These are the only profits that can be paid to stockholders or retained for use in the business.

In the first six months of 1953, corporate profits *after taxes* were at an annual rate of $20.4 billion. This was higher than in the first half of 1952, but lower than in the full years 1948 or 1950, or in the first half of 1951. If allowance is made for the declining value of the dollar, this year's net profits for all corporations represent less purchasing power than those made five or six years ago.

Here is the record of profits over the years:

	Net Profits After Taxes of All U. S. Corporations	
	Billions of Dollars	
	Actual	In 1953 Prices
1929	8.4	14.6
1939	5.0	9.8
1947	18.5	22.1
1948	20.7	22.7
1949	16.3	18.3
1950	22.7	24.6
1951	20.1	19.7
1952	18.6	18.7
1953*	20.4	20.4

*Annual rate, first six months

The record shows that real profits have a little more than doubled since 1939. This increase, however, does not mean that corporations are doing exceptionally well. The entire national income has doubled since 1939. And our industrial plant is more than twice as large as it was in 1939. Therefore, profits have just about kept pace with industrial growth.

Return on Investment

How high are profits compared with sales, or compared with the stockholders' investment?

What is the rate of return to the people who have invested their savings in corporate business?

The table below shows that for the past three years the rate of return on both sales and investment has been substantially below the return achieved in earlier postwar years. The rate of return on stockholders' investment is higher now than it was in 1939. But this is primarily because today's profits are reported in terms of today's prices, whereas much of the investment in plant facilities is still carried on the books at prewar prices, which are substantially below the cost of replacement. The current rate of return, measured as a percentage of total corporate sales, is below prewar levels.

	Corporate Profits After Taxes	
	Per Cent of Total Sales	Per Cent of Stockholders' Equity *
1929	6.1	NA
1939	4.1	4.0
1947	5.3	
1948	5.3	14.8 average
1949	4.4	
1950	5.3	
1951	4.1	11.8
1952	3.6	10.3
1953#	3.7	10.8

* Manufacturing corporations only
NA Not available
Annual rate, first six months

In considering these figures, it should be remembered that they are averages for all corporations. Some companies make more than the average, and many make no profit at all. In every year since 1915 at least 25% of all corporations have operated at a loss. In 1939, 58% of all corporations were losing money. This year the figure will probably be at least 30%. The improvement since 1939 shows a much healthier economy. But it does not indicate that profits are easy to make.

How Big a Share of the Pie?

The most important single fact about profits is that they now represent a *smaller* share of national income than they have in past years of normal prosperity. For the past three years, profits have taken a smaller share of the pie than in 1939, and considerably smaller than in the early postwar years. Here, as the chart at the beginning shows, is the record:

	Corporate Profits After Taxes as a Percentage of National Income
1929	9.6
1939	6.9
1947	9.3
1948	9.3
1949	7.5
1950	9.4
1951	7.2
1952	6.4
1953*	6.6

*Annual rate, first six months

The main reason for the declining corporate share of national income is, of course, the increasing share taken by the federal government in the form of taxes. The wage earners' share is also higher than in 1939. But the really startling increase is in federal taxes. Taxes on profits now equal almost 8% of the national income, compared to only 2% in 1939.

Why This Is Important

It is important that these facts about profits and taxes be widely understood. At its next session, Congress must consider what to do about the emergency taxes on profits enacted after the outbreak of the Korean War. The so-called excess profits tax is scheduled to die on January 1, 1954. In the absence of new legislation, the rate of the corporate income tax will drop from 52% to 47% on April 1. Many factors, including the revenue needs of the government, must enter into the decision whether or not to reduce taxes. But one fact stands out clearly: By comparison either with past years or with the total national income, corporate profits today are relatively low.

* * *

The second article in this series will discuss what corporations do with their profits.

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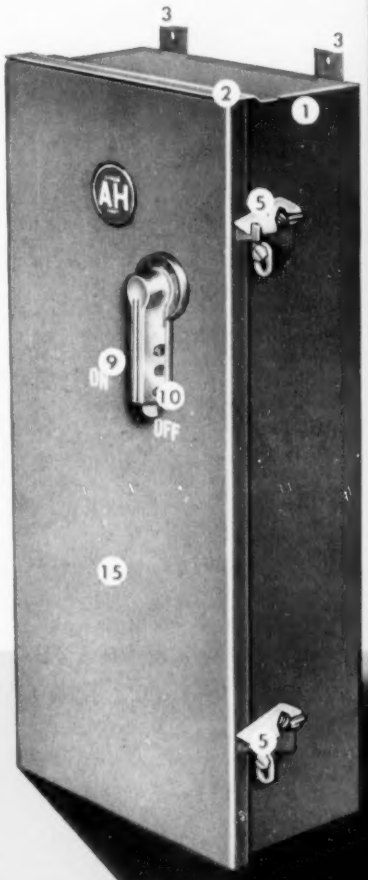

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3. **EXTERNAL MOUNTING BRACKETS** . . . let oil drain down behind enclosure.
4. **OIL PROOF NEOPRENE GASKET** . . . retained by both cement and channel.
5. **AUTOMATIC LATCHES** . . . hold door securely even if locking screws are accidentally left loose.

FOR ALL-NEW DISCONNECT

6. **HEAVY SILVER CONTACTS** . . . for long life.
7. **CONTACTS COMPLETELY VISIBLE** . . . maintenance man can SEE that the Disconnect is off.
8. **CONTACT CARRIER INSTANTLY REMOVED** . . . for inspection or replacement.
9. **SIMPLE, SAFE, STURDY MECHANISM** . . . **COVER CAN'T BE OPENED WITH DISCONNECT ON** . . . handle must be turned to "Open" with Disconnect "Off".
10. **HANDLE PROVIDES FOR 3 LOCKS** . . . can only be locked in the "Off" position.

GENERAL

11. **ENTIRE COMBINATION REMOVABLE** . . . from box by merely loosening two non-removable screws.
12. **TRANSFORMER FUSED ON SECONDARY SIDE.**
13. **TYPE "RA" STARTER** . . . with exclusive "Right Angle" Operating Mechanism.
14. **ALL CONTROL WIRING *RED*** . . . **ALL LINE WIRING BLACK.**
15. **SMALLER SIZE** . . . Size 1 unfused . . . entire unit is just 15 3/16" x 7 1/2" x 4 5/16".

ENGINEERED FOR SAFETY

NEMA TYPE XII built to JIC STANDARDS

TURN THE PAGE FOR ADDITIONAL INFORMATION

SIZE 2 NEMA XII

ENTIRELY NEW
OUTSTANDINGLY ADVANCED
EXACTLY RIGHT FOR INDUSTRY'S NEEDS

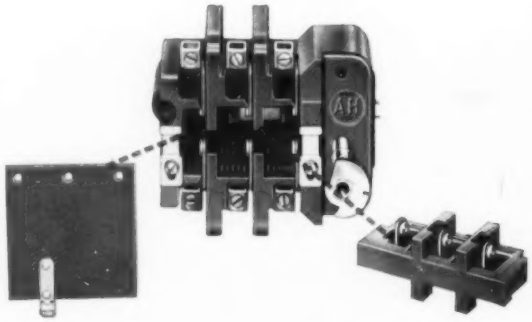
ARROW AH HART

TYPE "RAC" COMBINATION STARTER

Leading Machinery Engineers throughout industry worked with us to develop this all-new, "RAC" Across-the-Line Combination Starter. The NEMA Type XII is designed, engineered and constructed to meet all JIC Standards for Safety, Oil Tightness and Convenience in both operation and maintenance. In addition, the Type "RAC" offers smaller size plus new standards of electrical performance and dependability . . . possible only with the exclusive Arrow-Hart "RA" Starter Design.

Incorporating EXCLUSIVE "RA" DESIGN with All-New "RAD" DISCONNECT

The "RAD" Type Disconnect is a completely new, front operated design that offers many important advantages for both safety and convenience. The operating mechanism is simple and rugged with a safe "Off" position. The enclosure door of the "RAC" cannot be opened unless the operating handle is moved to the "Open" position and the Disconnect is off. The handle has provision for three padlocks and can be locked only in the "Off" position. The butt-to-butt type contacts of heavy silver are provided with a clip-on cover that may be used or not as desired. When this cover is removed, the contacts are completely visible for easy inspection . . . and to give the maintenance man an additional *visual* assurance that the Disconnect is off. The Contact Carrier . . . held in place by two swinging latches . . . can quickly and simply be removed entirely for fast, easy inspection, maintenance or replacement.



Available

- With GENERAL PURPOSE (NEMA TYPE I) ENCLOSURE
- With SEMI-DUST (NEMA TYPE IA) ENCLOSURE
- With OILTIGHT (NEMA TYPE XII) ENCLOSURE
- With DISCONNECT . . . Fused or Unfused Type
- With CIRCUIT BREAKER TYPE DISCONNECT
- REVERSING and TWO SPEED TYPES
- In NEMA SIZES 0, 1 and 2 . . . with Sizes 3 and 4 coming soon
- With or without CONTROL CIRCUIT TRANSFORMER

SEND NOW FOR COMPLETE INFORMATION ON THE TYPE "RAC" COMBINATION STARTER

AH

Industrial Control Division
THE ARROW-HART & HEGEMAN ELECTRIC COMPANY
103 Hawthorn Street, Hartford 6, Conn.

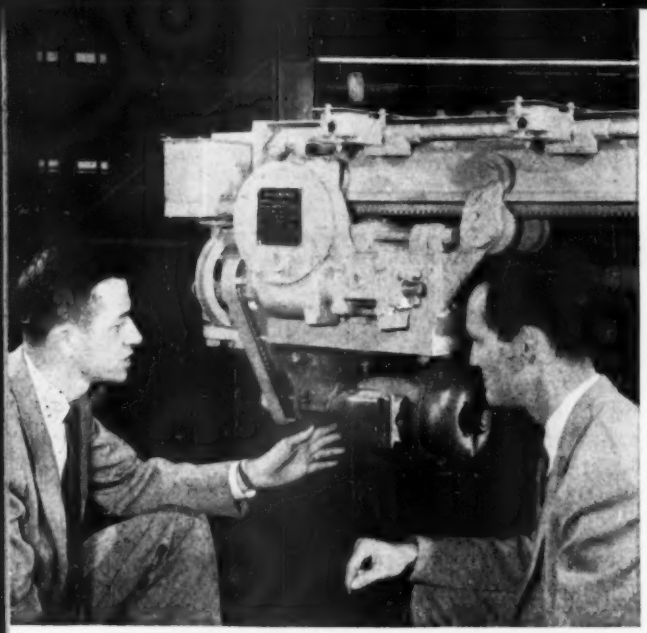
Please send me complete product literature covering:
☐ *Type "RAC" Combination Starters* ☐ *"RA" Motor Control Design Story*

NAME _____
POSITION _____
COMPANY _____
CO. ADDRESS _____
CITY _____ ZONE _____ STATE _____

ARROW-HART
INDUSTRIAL CONTROL DIVISION
THE ARROW-HART & HEGEMAN ELECTRIC COMPANY
HARTFORD 6, CONNECTICUT

OFFICES, SALES ENGINEERS AND WAREHOUSES IN: ATLANTA, BOSTON, BUFFALO, CHARLOTTE, CHICAGO, CINCINNATI, CLEVELAND, DALLAS, DETROIT, HOUSTON, INDIANAPOLIS, KANSAS CITY MO., LOS ANGELES, MILWAUKEE, MINNEAPOLIS, NEW YORK, PHILADELPHIA, PITTSBURGH, ST. LOUIS, SAN FRANCISCO, SYRACUSE. Sales Engineers in Columbus O., York, Pa., Fayetteville New York, Manchester Ct., Seattle, Springfield Mass. In Canada: ARROW-HART & HEGEMAN (CANADA) LTD., MT. DENNIS, TORONTO.

PRINTED IN U.S.A.



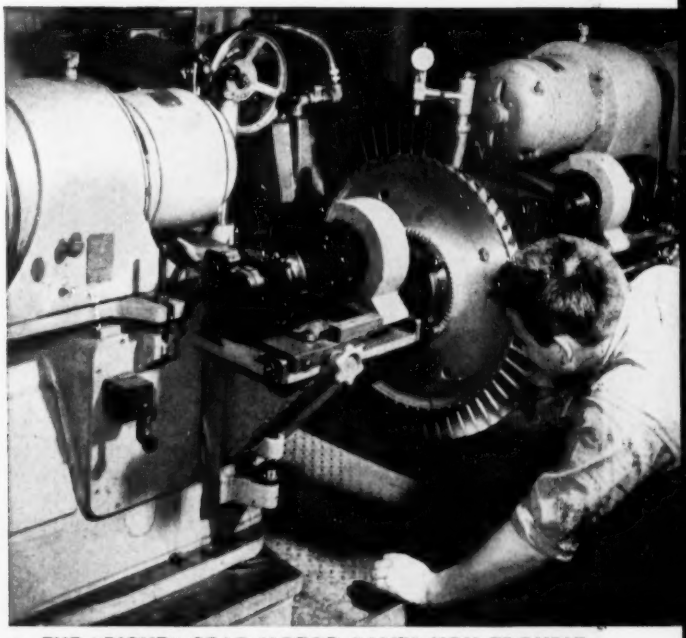
1 QUICK INSTALLATION SAVES YOU MANHOURS when G-E gear-motor is used on compact machines like this soot blower for power plant equipment. Neat, packaged construction permits quick, easy installation in limited space.

2 SIMPLE MAINTENANCE SAVES YOU MONEY. If electrical maintenance is ever needed on this G-E Tri-Clad gear-motor—driving scraper in a grannery—3-piece design will permit stator removal without disturbing gear train.

Save 4 Ways with G-E TRI/CLAD Gear-motors

REG. U.S. PAT. OFF.

3 PROMPT DELIVERY SAVES YOU TIME—assures you of getting the gear-motor you need when you need it. A new multiple point stock plan permits one-week delivery on more than 300 models of General Electric gear-motors.



4 THE "RIGHT" GEAR-MOTOR SAVES YOU TROUBLE on precision operations like grinding jet engine bucket blades. General Electric's wide selection assures you of the correct gear-motor for your particular low-speed application.

For more information about G-E Tri-Clad gear-motors contact your nearest G-E representative, agent, or distributor, or write to General Electric Company, Section 755-12, Schenectady 5, N. Y. for your free copy of new Bulletin GEA-1437H.

GENERAL ELECTRIC

"Cut costs with Buckeye Conduit-- it bends so uniformly!"

MIDWEST CONTRACTOR TALKS ABOUT CONDUIT: "When I pay good money for workers, I want the utmost in production. That's why I use Youngstown "Buckeye" conduit. My men bend and install "Buckeye" in short order without wasting precious time."

ELECTRICAL WHOLESALER DESCRIBES BUCKEYE CONDUIT: "My customers tell me that bending "Buckeye" evenly takes a minimum of time and effort. This enables them to cut down on overtime work. As far as I'm concerned, I recommend "Buckeye" highly."

Youngstown makes rigid steel conduit from start to finish. This enables Youngstown to control the complete manufacturing process which insures that each length of "Buckeye" Conduit is made of topgrade steel. Since only high quality steel makes for easy bending, it's no wonder Youngstown "Buckeye" conduit is favored by electrical men.

Shipments of "Buckeye" rigid steel conduit are now being made from our conduit mills at Indiana Harbor and Youngstown.

QUALITY YOUNGSTOWN SERVICE

THE YOUNGSTOWN SHEET AND TUBE COMPANY

General Offices — Youngstown 1, Ohio

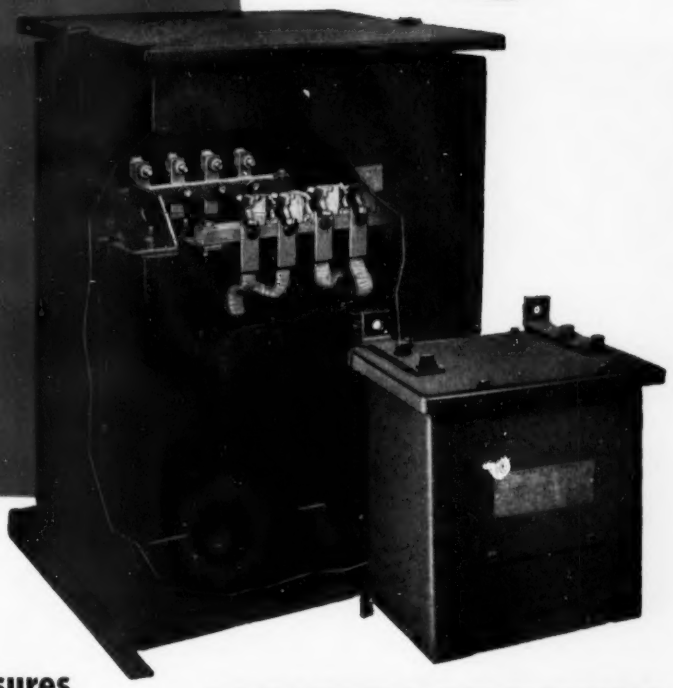
Manufacturers of Carbon, Alloy and Yoloy Steel

Export Office-500 Fifth Avenue, New York

COLD FINISHED CARBON AND ALLOY BARS · ELECTROLYTIC TIN PLATE · COKE TIN PLATE · WIRE · PIPE AND TUBULAR PRODUCTS · CONDUIT · RODS · SHEETS · PLATES · BARS · RAILROAD TRACK SPIKES

Compact Design Saves Time

ALLIS-CHALMERS Dry-Type TRANSFORMERS



★ **Simplifies Installation**

★ **Makes Handling Easy**

★ **Eliminates Vaults or Enclosures**

It's easy to install an Allis-Chalmers dry-type transformer. Compact design results in a small, light weight transformer that can be easily handled.

There is plenty of work space in the big, roomy wiring compartment, too, for connecting system cables. Conduit knockouts are provided. Hookup time is reduced to minutes through the use of solderless clamp-type connectors on sizes 15 to 50 kva, inclusive, single phase, and sizes 45 to 112½ kva, inclusive, three phase.

Get These Benefits

All-welded case gives complete protection. No additional enclosures or vaults are required. Surface finish is resistant to corrosion by acids, vapors or moisture. Surface is Spra-Bonderized. Three coats of alkyd-resinous paint are then separately baked on.

Let Allis-Chalmers Class "B" dry-type transformers furnish full voltage at the load. To get complete information, contact your nearby Allis-Chalmers District Office or write Allis-Chalmers, Milwaukee 1, Wisconsin.

A-4034

DESIGN ARRANGEMENTS

KVA SIZES		MOUNTING ARRANGEMENT	TERMINATIONS
SINGLE PHASE	THREE PHASE		
3 5 10	9 15	WALL MOUNTING LUGS	BOTTOM TERMINAL COMPARTMENT WITH REMOVABLE FRONT PLATE
15 25	30	WALL MOUNTING LUGS AND BASE FOR PLATFORM MOUNTING	TOP TERMINAL COMPARTMENT WITH REMOVABLE COVER
37½ 50 75 100 167	75 112½ 150 225 300	BASE FOR PLATFORM MOUNTING	TOP TERMINAL COMPARTMENT WITH REMOVABLE COVER

ALLIS-CHALMERS

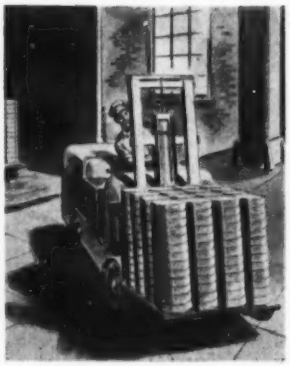
Another General Cable FIRST

New, More

STRONGER!

EASIER TO HANDLE, STACK, DELIVER, STORE

Sturdier corrugated stock. Edges supported at 8 points, plus double and triple reinforcement on sides mean damage-free shipments.



MODERN! EXCLUSIVE! *

TRAVELS EASILY... IS WEATHER-RESISTANT

Rough handling on thousands of miles of test shipments (under varying weather conditions) have proved its greater ability to stand up.

STREAMLINED!

EASIER TO OPEN AND USE

Full 7-inch knockout pays out wire effortlessly... neither wire nor carton is damaged where wire is pulled out.

CONVENIENT!

EASY-TO-READ LABELS

Close-up or at a distance you can readily determine the contents. A big time saver in storage warehouses. Three sides always visible from any position.

General Cable as usual comes up with a *first*. Attention to the individual needs of our customers and friends throughout the world enables us to efficiently serve all industries. For more information call or write your nearest distributor or General Cable office.

"More Power to You" ®

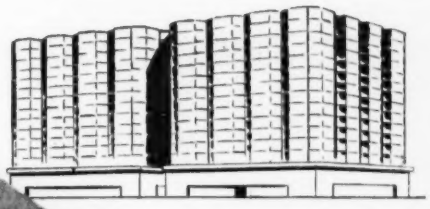
GENERAL CABLE

CORPORATION

Executive Office: 420 Lexington Avenue, New York 17, N. Y. • Sales Offices in Principal Cities of the United States

*Exclusive under Hinde & Dauch Paper Co., U. S. Patent No. 2347422

Rugged Carton



LESS CRUSHING!

CORNERS STAND UP!

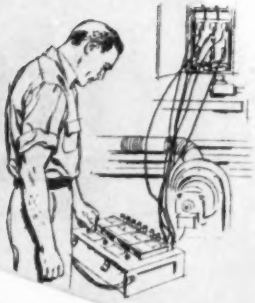
EASIER PRODUCT IDENTIFICATION!

NOW

PACKED THIS CONVENIENT WAY..

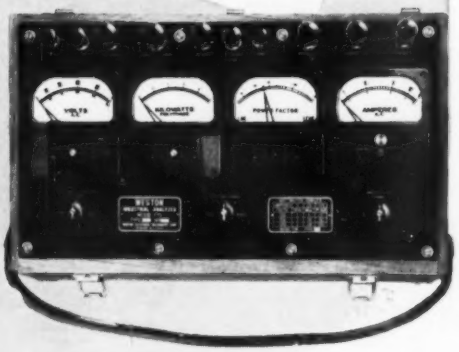
All types R from No. 14 through No. 8
All types RH from No. 14 through No. 12
All types RH-RW from No. 14 through No. 8
All types TW from No. 14 through No. 6
All types Romex 2 and 3 conductor
with and without Ground Wire
Packaged Weatherproof

tools that Streamline electrical maintenance



FOR POWER PROBLEMS...

FOR MOTORIZED EQUIPMENT...



FOR ELECTRONIC TROUBLE SHOOTING...

WESTON A-C INDUSTRIAL ANALYZER
(Model 639) a combined Voltmeter, Wattmeter, Power Factor Meter, Ammeter . . . all interconnections made!

A real timesaver because only one hook-up is necessary to measure a-c current, voltage and power in single and polyphase circuits, as well as power factor in 3 phase, 3 wire, balanced circuits. Adequately insulated binding posts . . . high overload capacity. Furnished in compact oak carrying case measuring only 18⅞" x10⅞"x6⅞".

WESTON CLAMP VOLT-AMMETER
(Model 633) measures current and voltage without breaking circuits and disrupting operations.

Combines in one instrument five full-scale a-c current ranges of 1000/250/100/25/10 amperes with range overlap for good readability . . . three self-contained a-c voltage ranges of 700/350/-175 volts, with instrument insulated for 750 volt service. Has convenient 6-position thumb switch for range selection, and adjustable pointer stop for measuring motor starting current.

WESTON INDUSTRIAL CIRCUIT TESTER
(Model 785) the versatile 28 range super-sensitive portable tester.

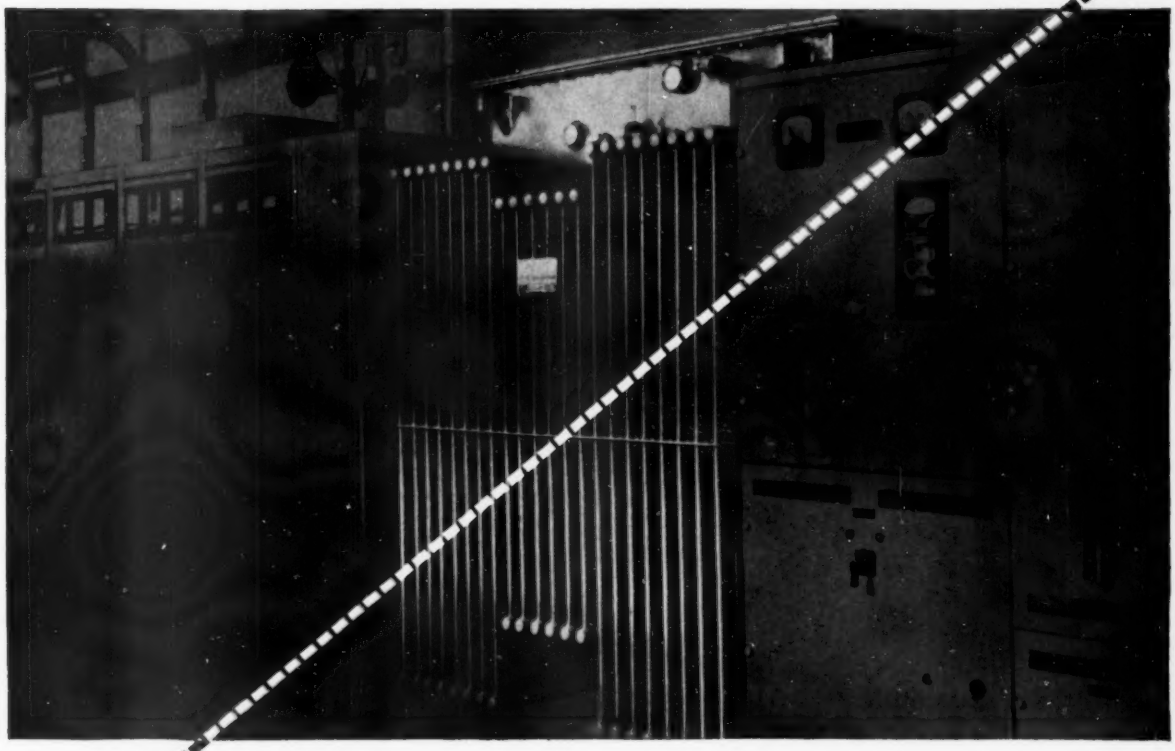
Especially designed for checking electronic control and power equipment. Seven d-c voltage ranges: .1 to 1000 (20,000 ohms per volt) . . . six a-c voltage ranges: 5 to 750 (1000 ohms per volt) . . . six d-c current ranges: 50 microamperes to 10 amperes . . . four a-c current ranges: .5 to 10 amperes . . . five resistance ranges: 3000 ohms to 30 megohms . . . all ranges full scale . . . a-c and d-c current ranges extended with external transformer or shunts. New temperature compensated rectifier circuit gives greater a-c accuracy.

AVAILABLE THROUGH LEADING DISTRIBUTORS

WESTON *Instruments*

WESTON Electrical Instrument Corp., 614 Frelinghuysen Ave., Newark 5, N. J.

Where DEPENDABILITY really counts



MOLONEY Askarel Load Center Transformers do the job

Since the health of an entire city can depend upon its waste disposal system, the City of Los Angeles set the most rigid specifications for equipment in its Hyperion Activated Sludge Plant. This Load Center—the heart of the entire operation—must function around the clock and around the calendar with exceptional dependability.

Moloney Askarel Load Center Transformers were incorporated in these Load Centers, not only because they met the specifications, but because they are noted for their ability to provide continuous, reliable service under all operating conditions. Since they are installed indoors, these transformers are supplied with Askarel...Moloney's safe, non-inflammable cooling and insulating liquid.

For over fifty years, Moloney Transformers have been noted for containing that "extra something" that contributes to their longer life and greater dependability. For your next Load Center or Transformer Installation . . . where continuity of service is of the utmost importance...specify Moloney Transformers.

MED-28

MOLONEY ELECTRIC COMPANY

Manufacturers of Power Transformers • Distribution Transformers • Load Ratio Control Transformers • Step Voltage Regulators • Unit Substations

SALES OFFICES IN ALL PRINCIPAL CITIES • FACTORIES AT ST. LOUIS, MO. AND TORONTO, ONT., CANADA

Announcing

Westinghouse unconditional lighting fixture warranty

You name the terms . . . we'll back you up! This seal places an unconditional warranty as to workmanship and material on Westinghouse lighting fixtures for the life of your own installation guarantee.

A job well done deserves to be backed up, whatever the length of guarantee. Your guarantee expresses confidence in the quality of your work. That's why we go beyond the limits of the usual term guarantee. We believe in the quality of Westinghouse lighting fixtures. We'll match—with a warranty on our lighting fixtures—your installation guarantee to customers.

We feel there is no better way to demonstrate the lasting benefits of quality workmanship.:: quality materials. You can literally make a lighting installation and forget it. It's a powerful door-opener to sales opportunities up and down the block in every town.

Remember, this warranty applies to the commercial, industrial and floodlighting line of Westinghouse lighting fixtures regardless of price, style or type. You'll want to get complete details on this plan to build more business through satisfied customers. Register with Westinghouse and get your personal copy of the Warranty Book. Send in the coupon today. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-04327

YOU CAN BE **SURE**...IF IT'S

Westinghouse

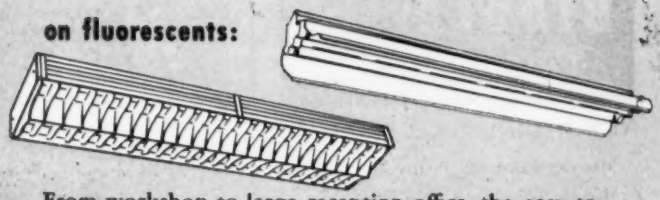
Warranty

LIGHTING FIXTURES

good for the life of your contractor's guarantee

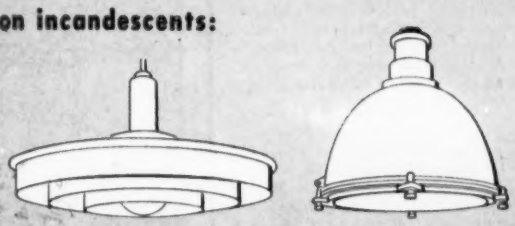
You install 'em we back you up

on fluorescents:



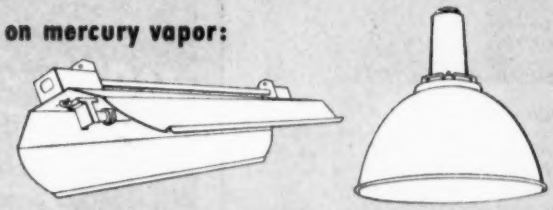
From workshop to large reception office, the easy to select and install Westinghouse fluorescents are built to last.

on incandescents:



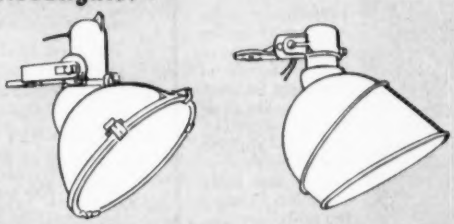
In clean or dirty locations, high or low bay areas, commercial or industrial buildings, Westinghouse incandescents fit every lighting need – with a long, outstanding service record.

on mercury vapor:



A complete line of fixtures – exclusive with Westinghouse – has zoomed to the front in industrial areas. They are easy to install – easy to maintain – designed to cut lighting costs.

on floodlights:



Built to weather outdoor service from construction projects to sports floodlighting jobs, Westinghouse floodlights are famous for ease of installation – dependable operation.

Sure – I want to know all about the new Westinghouse Lighting Fixture Warranty. Send me the simplified Selling Kit and Warranty Book.

FIRM NAME_____

MY NAME_____ TITLE_____

ADDRESS_____

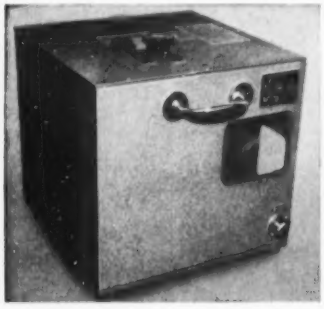
CITY_____ STATE_____

BIDDLE *Instrument News*

NEW HIGH VOLTAGE BRIDGE

Murray Loop Type for Use With Biddle Impulse Cable Fault Locating Transmitters

This new bridge is a high quality, compact, well-designed device to be used for localizing faults on power cables—particularly of the submarine and buried types. It is also useful in the case of duct line construction where water-filled manholes, ice, snow and traffic retard the location of faults by the impulse tracer method.



The entire bridge assembly is mounted in a metal case, 17″ by 17″ by 16″ high. The galvanometer and counter are observed through a clear plastic window in the top of the metal case. An opening in the side of the case gives access to the input and output terminals. The entire assembly weighs about 60 pounds. Write for **BULLETIN 65-ECM.**

ACCESSORY PICKUP LOOP

for use with Biddle Impulse Cable Fault Locator

In locating faults on buried cables there are cases where records of the exact location of the cable itself are questionable, and the problem becomes one of tracing the cable as well as locating the fault.

A pickup loop has been developed, as shown in the accompanying photograph, which is not only convenient to use in following buried installations, but is critical of any change in direction of the cable. It can also be used to estimate the depth of a cable by placing it on both sides of the cable run and noting the degree of tilt required to obtain a maximum signal. For complete description, write for **BULLETIN 65 ECM.**

Although designed primarily for use on lead covered cable installed in ducts, Biddle Cable Fault Locators are also used on aerial and buried cable. The new Model 4 Transmitter has a maximum output of 15 kv d-c and a discharge capacitance of 2 muf.

The Model 4 Transmitter requires a source of supply of about 600 va at 115 volts a-c and weighs about 150 lbs. complete with all test leads. Unit can be carried in any ordinary passenger car. It may be used as a source of d-c voltage for proof testing of cable and other insulation, a very valuable feature both at installation and after alterations or repairs. It provides a d-c over-voltage test facility that is particularly suited to cables and other electrical apparatus in the lower voltage classes. It has a maximum proof testing current capacity of 15 milliamperes at about .7 megohms and about 50 milliamperes at short circuit.

The Model 4 Transmitter is a strongly built unit equipped with the highest quality components available, and designed for hard service. The structural parts are a combination of steel and aluminum with the exterior finished in grey enamel hammertone finish.

For complete information on Biddle Cable Fault Locator equipment, write for our new **BULLETIN 65-ECM.**

B-935

JAMES G. BIDDLE CO.

- ELECTRICAL TESTING INSTRUMENTS
- SPEED MEASURING INSTRUMENTS
- LABORATORY & SCIENTIFIC EQUIPMENT

1316 ARCH STREET
PHILADELPHIA 7, PA.

now *unconditionally guaranteed no. 41* ***Levolier®*** *switch*

improved with new one-piece phenolic case

You can save money by specifying the Model 41 Levolier Switch because its use eliminates the need of replacement and reduces maintenance costs. It is the only switch unconditionally guaranteed against failure in lighting circuits. And now the Model 41 has a new rugged one-piece molded Phenolic case that provides better insulation and makes wiring easier and faster. Requires only removal of mounting nut to slip mechanism out of case and wire easily accessable terminals. Insert in case, slip lever through mounting means and replace nut. It is a 6 amp, "T", 125 volt; 3 amp, 250 volt switch, only 5/8" x 1 3/8" x 1 3/8". The No. 41 insures dependable lifetime service for conduit box and canopy mounting, incandescent or fluorescent lighting and for FHP motor control. *Underwriters' Laboratories Inspected.*

Send for the new McGill Catalog No. 49-A describing the full line of Levolier Switches, Sockets and Lamp Guards.

McGILL®
electrical specialties

McGILL MANUFACTURING COMPANY, INC.
450 N. Campbell St., Valparaiso, Indiana

model 1010
10A "T" 125V

model 71
6A "T" 125V

all are McGILL® quality

model 25
6A "T" 125V
Colored plastic levers

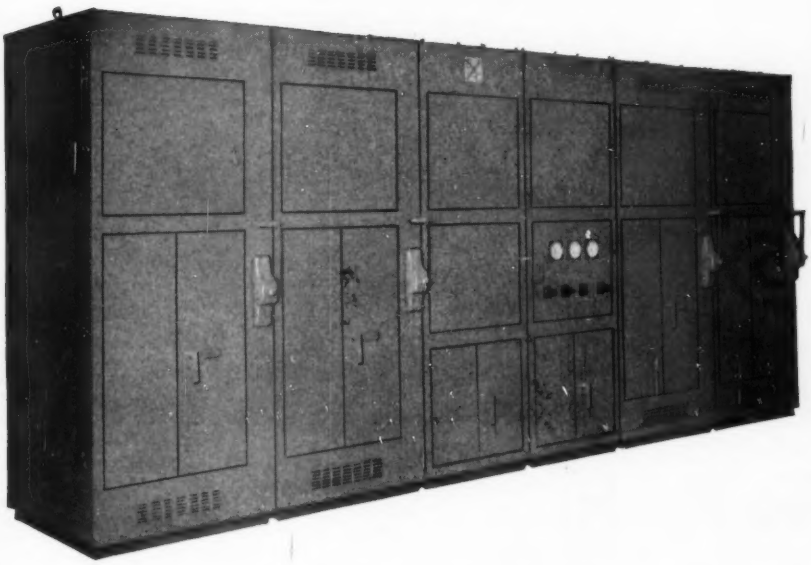
model 2020
20A 125V

4100 series
Industrial socket
600 watt — 250 volt

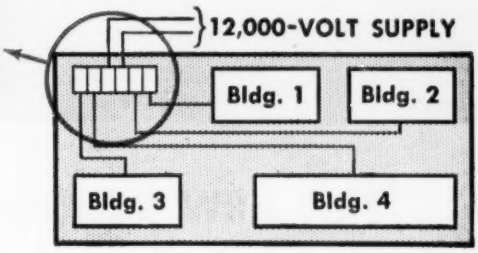
METALCLAD SWITCHGEAR PROVIDES

Low Cost Switching Centers

S&C has demonstrated time after time that expensive circuit breakers are usually unnecessary in switching centers. S&C Switchgear serves every needed purpose in high voltage industrial power distribution, at a cost usually about half that of circuit breakers.



In an aircraft plant, for instance, selection of S&C Metalclad Switchgear substantially reduced cost of the switching center. This 6-bay unit provides two separate metered sources of power, and protection for the outgoing feeders to the load centers in each of the buildings.



S&C BRINGS A NEW CONCEPT OF PROTECTION AND SERVICE

S&C equipment has been recognized by public utility engineers as "tops" for over 40 years. WHY? Because it permits greater flexibility in substation layouts—greater dependability in performance—greater convenience and safety of operation.

A new booklet on Metalclad Switchgear explains the fundamental concepts of S&C engineering, and how they affect the economics of industrial power distribution. Would you like a copy? Send the coupon.

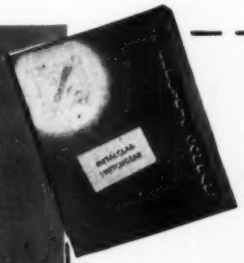
S&C ELECTRIC COMPANY

Formerly Schweitzer & Conrad, Inc.

4433 Ravenswood Ave., Chicago 40, Ill.

In Canada: S & C Electric Canada, Ltd., 8 Vernon Road, Toronto 14, Ont.

SPECIALISTS IN HIGH-VOLTAGE CIRCUIT INTERRUPTION



S&C Electric Company
4433 Ravenswood Ave., Chicago 40, Illinois

Please send me your new booklet on S&C Metalclad Switchgear. No obligation on my part, of course.

Name_____ Title_____

Company_____

Address_____

City_____ Zone____ State_____

"This new packaging plan for Westinghouse Breakers sure makes my job easier"

"It saves buying time. I can get immediate delivery of enclosed circuit breakers. And it speeds installation—eliminates taking the breaker out of the enclosure in order to mount the enclosure, run conduit and pull in cable."

Westinghouse is now packaging enclosures and breakers separately. This enables Westinghouse Distributors to offer you a complete line of AB-I Circuit Breakers—to meet any application by merely matching the right breaker frame and rating with the right NEMA enclosure. Separate packaging adds flexibility—prevents damage to AB-I's at the job site before installation—makes the whole job easier.

Now, more than ever, your best protection buy is AB-I. For rugged, reliable Westinghouse AB-I Circuit Breakers are tops in both performance and convenience. For more facts, see your Westinghouse Distributor or write for B-5456, Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-30171

YOU CAN BE **SURE**...IF IT'S

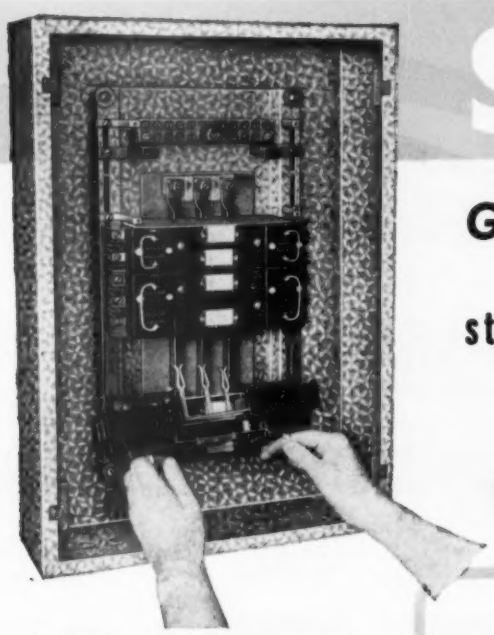
Westinghouse

APPARATUS DISTRIBUTOR WESTINGHOUSE W

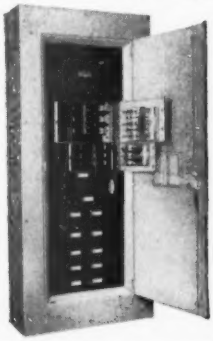
SAVE TIME . . . LABOR

Get faster deliveries with standardized FA interchangeable

PLUG-IN FEEDER PANELBOARDS



Pulfuzswitch Type of Panelboard with 30 ampere, 2 and 3 pole branches. Box is 19½" wide and 4¾" deep.



Panelboard illustrated is a combination of Pulfuzswitch and Klampswitchfuz branches. Box size is 24" wide and 10" deep.

Branch Circuit capacities are as follows:

FA PULFUZSWITCH
30, 60 and 100 amperes, 250 volts AC or DC; 30 and 60 amperes, 600 volts AC, 2, 3 and 4 poles.

FA KLAMPSWITCHFUZ
30 to 600 amperes, 250 volts AC or DC, 2, 3 and 4 poles.

FA SNUFARC
30 to 200 amperes, 600 volts AC, 2, 3 and 4 poles.

FA SHUTLBRAK
30 to 1200 amperes, 250 volts AC or DC, and 600 volts AC, 2, 3 and 4 poles.

Here's a panelboard that measures up fully to the modern demand for safe, efficient, economical and dependable power and light distribution.

Built of standardized units and assembled as required for specific application, FA Interchangeable Plug-In Feeder Panelboards not only provide adequate capacity for today's needs, but are so designed that future additions of circuits and changes in capacity can be made a simple matter of adding new units.

Three dependable FA Switches — the Pulfuzswitch, Klampswitchfuz and the Snufarc — make these panelboards the finest in safety and efficiency. All types combine switch and fuse in one unit so that current is "OFF" when the fuse carrier is removed or the door opened. This makes replacement of fuses safe, quick and simple.

Boxes are standardized as to width, height and depth to meet any combination of branches or any job requirement. They are shipped from stock, thus facilitating delivery. Except for smaller sizes, all boxes have removable ends to permit drilling of conduit openings on the job. Smaller boxes have standard knockout layout in ends. Generous wiring space and ease of installation are other features.

For operating switch requirements FA Shutlbrak Type A quick make and quick break interlocking switches are available.

Want to know more about these modern panelboards? Your nearest FA representative, listed in Sweet's, will be glad to provide it.

Frank Adam Electric Co.

P. O. BOX 357 ST. LOUIS 3, MISSOURI

Our 62nd Year

Makers of BUSDUCT • PANELBOARDS • SWITCHBOARDS • SERVICE EQUIPMENT • SAFETY SWITCHES • LOAD CENTERS • QUIKHETER

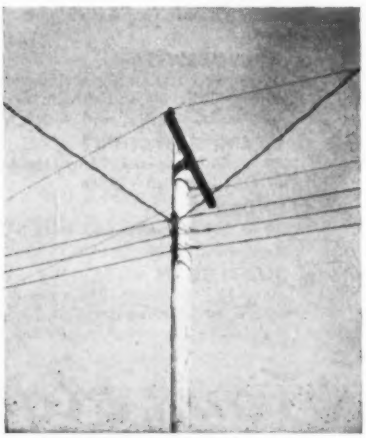
Rome Aluminum Triplex

Triplex Self-Supporting Secondary and Service Drop Cable—Regularly supplied with stranded or solid all-aluminum power conductors, insulated with RoPrene (Neoprene) and incorporating ACSR or other suitable bare neutral messenger. All-aluminum, copper or copperweld messengers are also available. RoLene (polyethylene) insulation can be supplied in place of RoPrene.

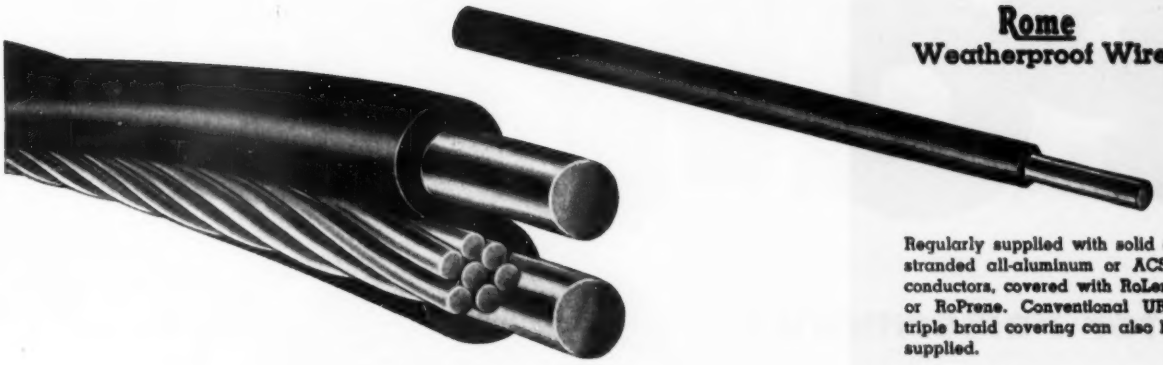
Rome Triplex Service Drop Cable provides neat, clean looking installation in new homes area.

Triplex is ideal for replacements on older houses too, particularly where eaves and roofs pose space problem.

Rome Triplex is less subject to damage by storm and falling tree limbs . . . . will remain in operation SAFELY even when down.



Installation at pole and house is easy and quick, cutting costly manhours and permitting less expensive hardware.



Rome
Weatherproof Wire

Regularly supplied with solid or stranded all-aluminum or ACSR conductors, covered with RoLene or RoPrene. Conventional URC triple braid covering can also be supplied.

OFFERS YOU A HOST OF COST ADVANTAGES

Many applications of Rome Aluminum Triplex secondary and service drop cable show outstanding cost advantages over conventional bare or weatherproof open wire construction.

For one thing, by proper mechanical design it may eliminate one-third to one-half the number of poles normally required. This adds up to a substantial saving. Further, it is also possible to utilize mid-span connections for service drops.

Rome Aluminum Triplex is particularly desirable for new residential developments. It is neat in appearance while mechanical design and light weight minimize sag tendencies. This cable construction, with its strong messenger, also affords greater protection against wind and ice loading damage.

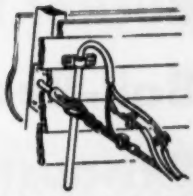
Fewer accessories are needed for secondary and service drop connections than for open wire construction. Maintenance is less costly; conductors are easily accessible.

Longer service life is assured because of mechanical design. RoPrene (Neoprene) and RoLene (polyethylene) insulation have exceptional resistance to weather and all climatic conditions. There are no braids to rot or festoon. Replacement is minimized.

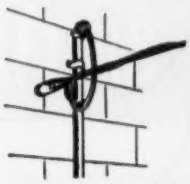
So whether it's secondary or service drop cable or weatherproof wire for distribution, Rome Aluminum offers you a host of advantages. May we send you samples?

Typical Connections

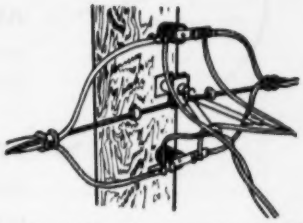
Service connection



Built-in attachment for dead-ending.



Dead end (house)



Service tap (from secondary cable)

Rome ALUMINUM

It Costs Less to Buy the Best

ROME CABLE CORPORATION, ROME, N.Y., AND TORRANCE, CALIF.

POWER

for Performance
for Profits
in the *Signal*
V-124A—24″
Bucket Blade
Ball-Bearing
Exhaust Fan

RUGGED—Heavy duty, totally enclosed capacitor type, ¼ H. P. motor. Welded angle steel frame—flange mounting. Reinforced welded steel blade assembly.

ADAPTABLE—Thrust bearings permit horizontal or vertical mounting. Conduit box on rear motor cover for easy accessibility. Two speed, push button industrial switch.

PRICED FOR PROFITS—The V-124A is a performance, value and profits-potential standout. It will pay you well to learn more about this featured item in . . .

the respected **Signal** *line*

Catalog sent upon request

SIGNAL ELECTRIC MANUFACTURING CO., MENOMINEE, MICHIGAN

Low Cost *Installation*

FACTORY PACKAGED RECTIFIER UNITS CUT INSTALLATION TIME AND COSTS

The factory packaged design of Allis-Chalmers sealed tube mercury arc rectifiers cuts labor time and costs. All component parts are metal-enclosed and integrally connected into one complete unit. This unit can be located convenient to your dc load center to cut dc feeder cost and reduce dc distribution loss . . . requires no special concrete foundation. And because of its light weight, it can be installed on a balcony or elsewhere to conserve valuable floor space. Only connection to power and control leads and to cooling water supply is necessary to make unit ready for service.

Allis-Chalmers sealed tube rectifiers are offered in ratings from 200 kw at 250 volts to 1000 kw at 600 volts.

When you are planning a new dc power installation of *any* size, it will pay you to investigate the many cost cutting features of the Allis-Chalmers rectifiers. For complete details, call your nearest A-C sales office, or write Allis-Chalmers, Milwaukee 1, Wisconsin. A-4144

MERCURY ARC RECTIFIERS

This 500 kw Allis-Chalmers factory packaged mercury arc rectifier unit is installed at a large Wisconsin plumbing fixture manufacturer. From left to right, the unit consists of dc feeder and cathode breaker compartments, rectifier tube compartment, rectifier transformer, and 12.5 kv ac switchgear compartments. Since its installation, this unit has greatly reduced costs of dc electric service to cranes, material handling equipment and machine tools.

A-C ALLIS CHALMERS

ALLIS-CHALMERS

Our Engineers Introduced Mercury Arc Rectifiers to U. S. Industry

Electrically, it's Westinghouse in St. John's Hospital, Springfield, Missouri. Architect-engineers Marguolo & Quick worked closely with Westinghouse to design an electrical system that is both efficient and economical. Westinghouse equipment includes switchgear, bus duct, power centers and 89 De-ion Circuit Breaker Panelboards.

Don't take chances with your hospital jobs

Install Westinghouse Panelboards for maximum protection . . . lower job costs

In hospitals, an element of safety depends on the circuit protection provided by panelboards. That's why contractors are turning to Westinghouse De-ion® Circuit Breaker Panelboards for hospitals and other jobs where long-lasting dependability is all important. Westinghouse Panelboards not only incorporate circuit breakers using the well-known de-ion principle, but other features of construction which provide life-long, trouble-free service.

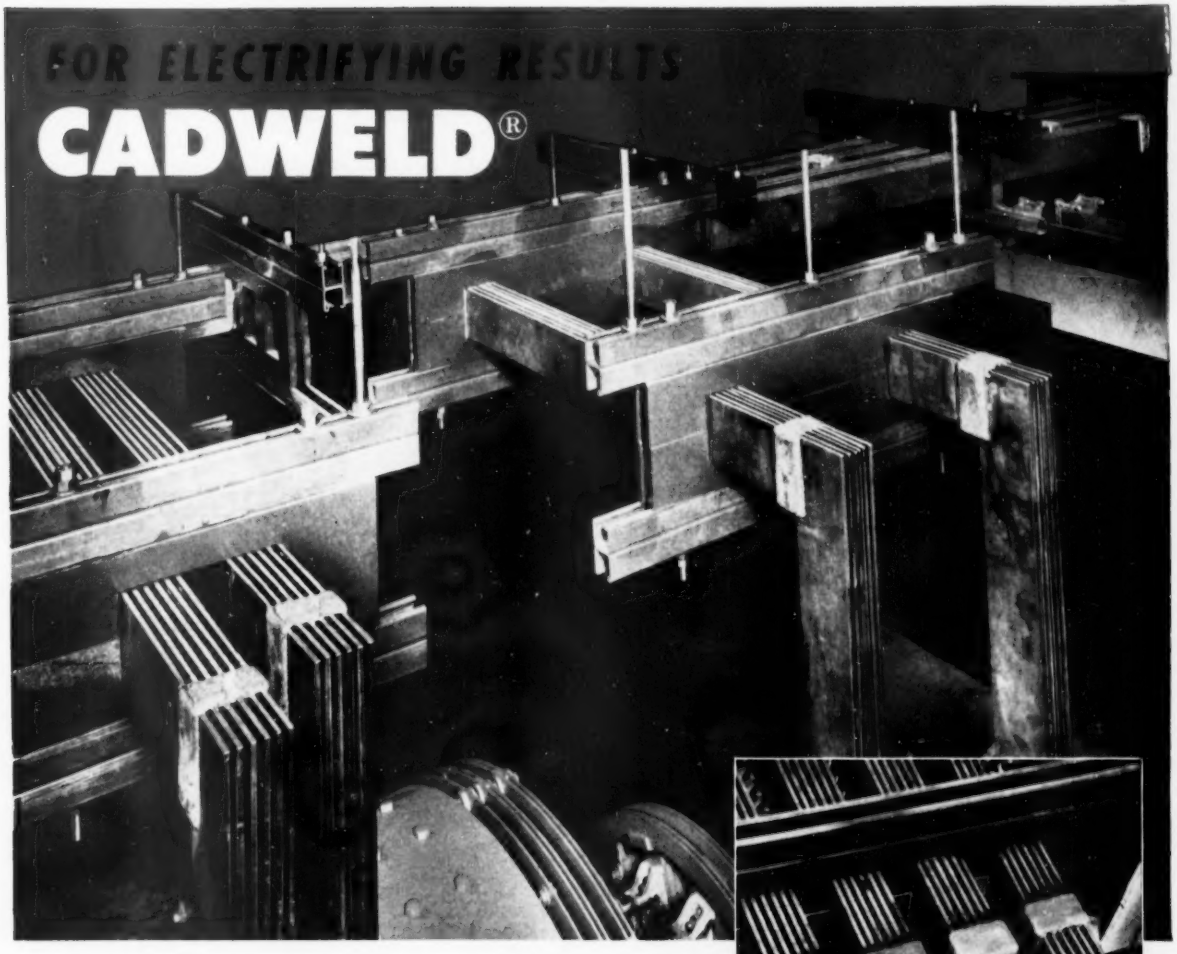
There's a Westinghouse Panelboard for any circuit protection problem . . . in any type of building. Thirteen assembly plants give fast service and quick delivery throughout the country.

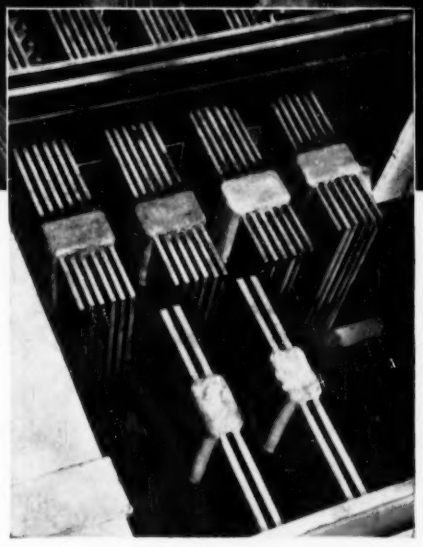
For the full story, call your Westinghouse Representative, or write for B-5260-A, Westinghouse Electric Corporation, Box 868, Pittsburgh 30, Pennsylvania. J-93499-A

YOU CAN BE SURE... IF IT'S Westinghouse

FOR ELECTRIFYING RESULTS

CADWELD®





HAMILTON STANDARD DIVISION of UNITED AIRCRAFT CORPORATION installs main feeder bus for plating tanks with CADWELD. Six ¼" x 4" busbars welded at one time by the CADWELD PROCESS insure 100% performance as connections cannot LOOSEN or CORRODE.

For the best in electrical connections—specify CADWELD.

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Send Coupon for FREE CADWELD ELECTRICAL CONNECTION CATALOG

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☐ Send CADWELD ELECTRICAL CATALOG and place my name on permanent mailing list.

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ADDRESS_____

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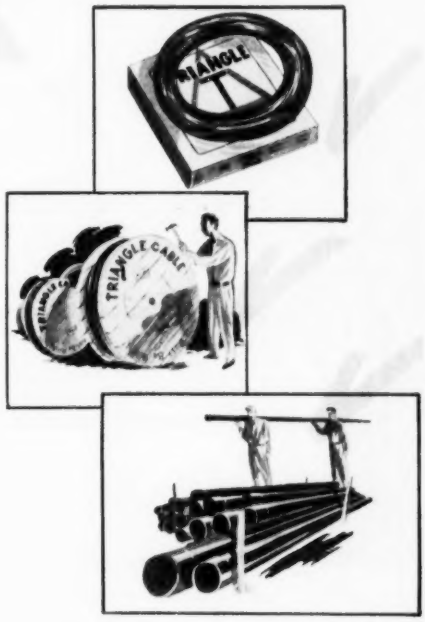
When it Comes To WIRE CABLE CONDUIT

Remember—

TRIANGLE

Makes All Three!



Whether it's a bungalow or an atomic energy plant, when it comes to the selection of wire, cable or conduit, just say "Triangle" to your distributor. It makes sense to order all three with the same brand name. Deliveries are surer, there's less paper work and there's a feeling of confidence right down the line.

We're proud that thousands of America's top engineers, contractors and purchasing agents regularly put their confidence in us. Perhaps the reason is because of what we *give* — friendship, help, cooperation and top quality products.

No Matter Who You Are—

You'll Like Doing Business with **TRIANGLE**

The Trade Mark of TOP Quality

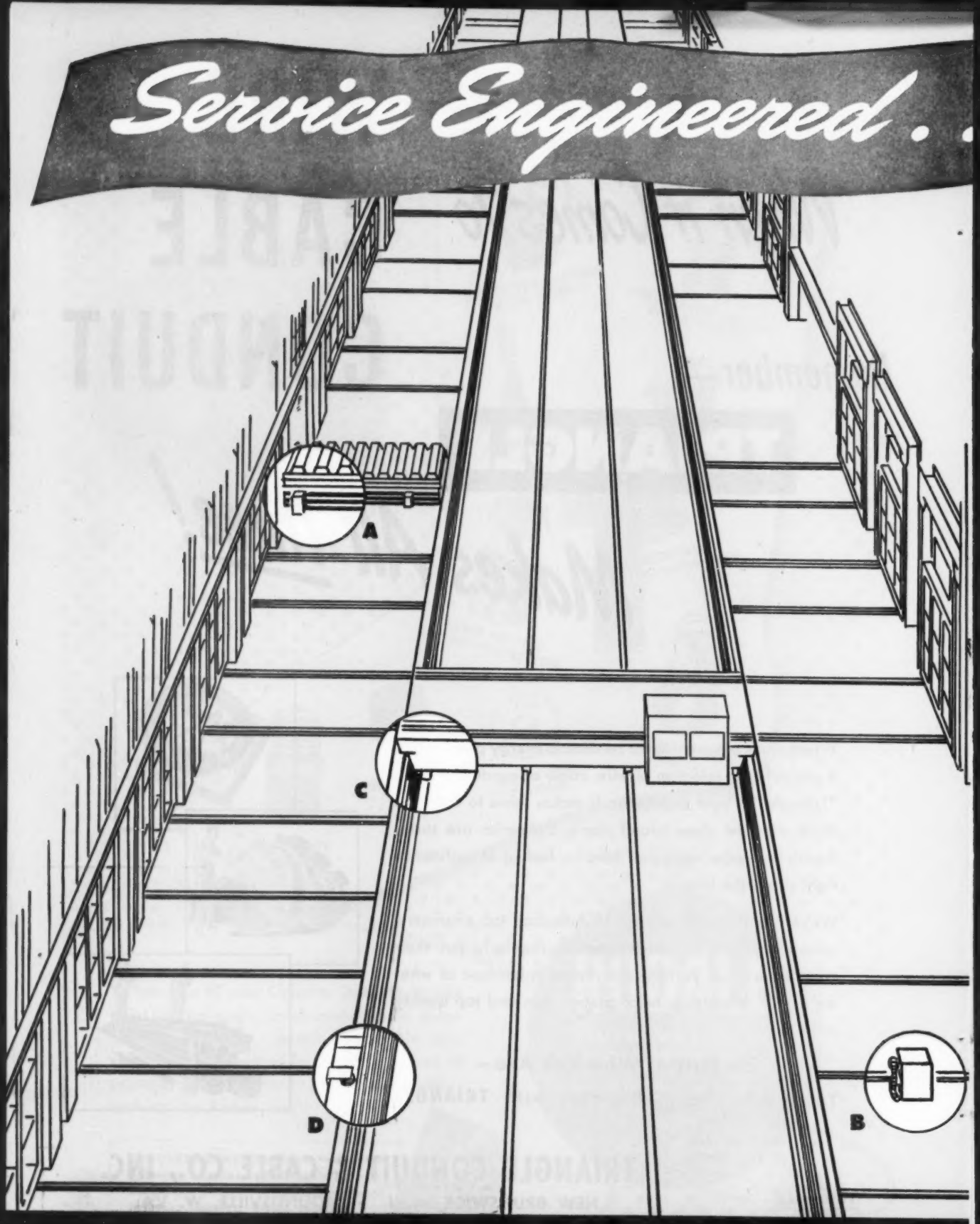
TRIANGLE

IT WILL DO RIGHT!

TRIANGLE CONDUIT & CABLE CO., INC.

NEW BRUNSWICK, N. J. • MOUNDSVILLE, W. VA.

When it's a question of carrying electrical power, specify **TRIANGLE**



ELECTRIC SERVICE MANUFACTURING CO.

ELECTRIC SERVICE EQUIPMENT

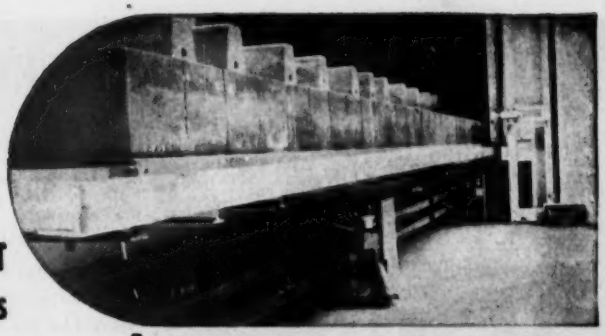
IS BUILT TO MEET RUGGED SERVICE DEMANDS

Rugged service is routine in this huge installation in the Armorcast Plant of the Birdsboro Steel Foundry and Machine Company. Electric Service collector and insulation equipment was specified throughout by Gilbert Associates, because it is "service-engineered" to provide continuous trouble-free performance under severe operating conditions.

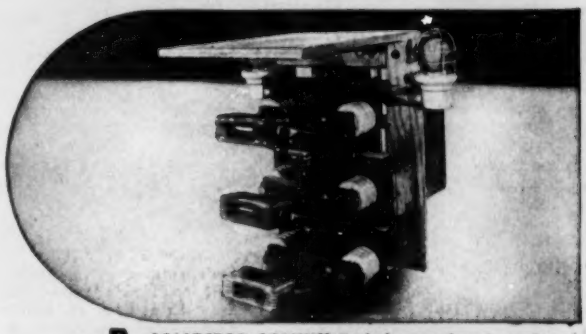
Here, in a battery of heat treating furnaces, heavy cumbersome tank hulls are conveyed on refractory-bed furnace cars. Rails fastened to the movable furnace cars are energized by the stationary Keystone Type LMI Collectors in the column.

All work movement is controlled through the pit transfer car. Individual furnace service lines are energized only when this pit transfer car is correctly aligned to pick up or deliver a furnace car at a particular furnace.

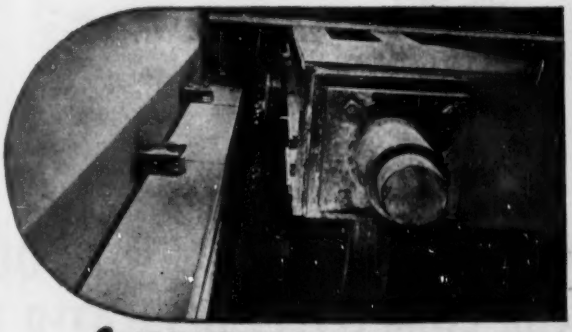
Whatever your plans, heavy-duty or ordinary industrial service, just call or write our service-engineering department. There is no obligation . . . their service is yours for better power transmission.



A **FURNACE CAR** Rail assembly is mounted on furnace car bed, using split porcelain Keystone Under-Contact Rail Insulators.



B **COLLECTOR COLUMN** Each furnace bay is equipped with three service columns. Collectors are Keystone Type LMI. Insulators are Keystone Glastic.



C **PIT TRANSFER CAR** This prime mover is equipped with the efficient, Type L Collectors on a seven rail contact assembly.

D **PIT RAIL ASSEMBLY** Flat rails and Keystone Glastic Insulators require minimum vertical space. Upper rails are plywood protected. Rails on opposite side energize furnace cars.

Write for detailed catalogs.

Philadelphia 32, Pa.

Represented in Canada by Lyman Tube and Bearings, Ltd., Montreal and Toronto

If you sell, specify, or install electrical wiring devices : make it

P&S

Designed for Easy Wiring . . . for Hard Usage Year after Year

P & S KEYLESS LAMPHOLDERS

Practically every wiring installation calls for one or more of these lampholders. Strictly utilitarian, yes — but made of fine P&S porcelain with a quality P&S interior, they will give years of trouble-free service.

For 3¼" box — P&S 41.

For 3¼" and 4" boxes — P&S 110.

P&S 110

P & S PULL LAMPHOLDERS

P&S 4046-2

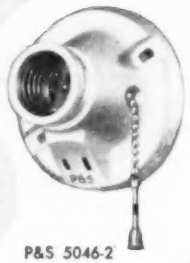
Feature one-piece construction — no separate shadeholder ring to loosen and fall off. Built-in mechanism of simplified design with terminal screws in most get-at-able position, eliminates necessity of removing interior to wire.

For 3¼" box — P&S 4026 with insulated chain, P&S 4026-2 with short chain and cord.
For 3¼" and 4" boxes — P&S 4046 with insulated chain, P&S 4046-2 with short chain and cord.

P & S PULL LAMPHOLDERS with CONVENIENCE OUTLETS

Have same one-piece construction as the P&S 4026 Line, PLUS a convenience outlet connected internally — no extra wires, soldering or taping. Ideal for attic, basement, garage, etc., where inexpensive lampholder with outlet is desirable.

For 3¼" box — P&S 5026 with insulated chain, P&S 5026-2 with short chain and cord.
For 4" box — P&S 5046 with insulated chain, P&S 5046-2 with short chain and cord.



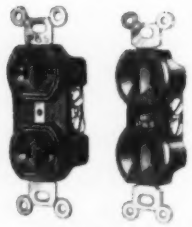
P&S 5046-2

P & S 1530 and 1570 — The OUTLETS with COMPLETELY INSULATED BACKS

Both P&S 1530 and P&S 1570 are easy to wire. Large head binding screws are spaced far apart — bodies are shorter, leaving more room in box. Plate screw hole in strap — no rivet to twist or turn. Both outlets have long-life phosphor bronze contacts — washer type ears — easy find slots.

P&S 1530 (brown) and P&S 1530-I (ivory) — T slot type.

P&S 1570 (brown) and P&S 1570-I (ivory) — Parallel slot type, double grip contacts.



P&S 1530 P&S 1570

Illustrated are just a few of the hundreds of wiring devices in the complete P&S line. All lampholders shown conform to Fed. Spec. W-L-142. Outlets conform to Fed. Spec. W-R-151. Every P&S device is a quality device — the result of experienced engineering, precision manufacturing and rigid inspection. Every P&S wiring device is BUILT TO LAST.

YOU CAN'T AFFORD LESS THAN THE BEST

Write Now for Catalog
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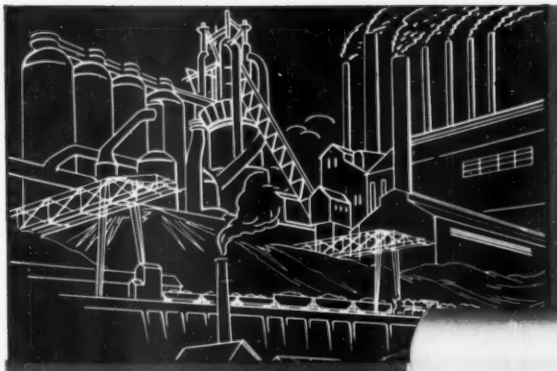
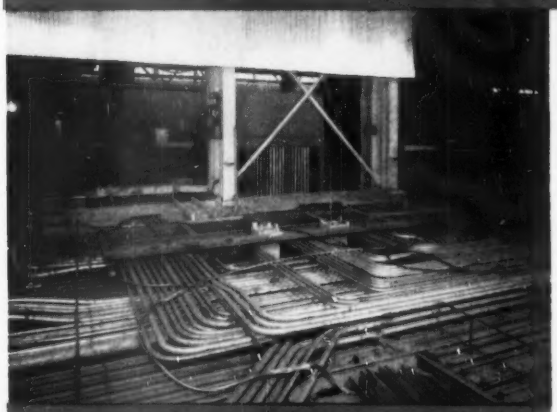
OFFICES: 71 Murray St., New York 7, N. Y. 1229 W. Washington Blvd., Chicago 7, Ill.



in a Pittsburgh steel mill....

112 Tons of SPANG Central Conduit



Today's modern steel plants use tremendous quantities of electric power to operate the many complex steel producing and processing machines needed to keep up with demand for steel products.

Installations of this type require conduit that . . .

—offers years of trouble-free service in a permanent installation.

—protects circuits in concrete-enclosed locations against pressure from concrete and corrosion from seepage.

—protects circuits in exposed interior locations against corrosion from atmospheric conditions, radical temperature changes and damage from contact with heavy equipment.

So, when Patterson-Emerson-Comstock, Inc., of Pittsburgh, specialists in steel mill construction, were called upon to build a new mill for a Pittsburgh steel manufacturer, they installed 112 tons of 1" to 4" Spang "Cenlaco" Conduit throughout the mill to handle the electrical circuits.

There were two reasons for specifying Spang:

1. SPANG CONDUIT IS QUALITY-CONTROLLED
Made from top-quality steel, Spang Central Conduit is carefully controlled under exacting conditions during forming and is thoroughly inspected to assure you of a reliable product with years of service life.

2. SPANG CONDUIT IS INSTALLED FASTER
Because of its quality-controlled manufacture, Spang Central Conduit offers such working advantages as easier bending, cutting and threading which saves time and money on installations.

You'll be sure of getting the finest conduit when you specify Spang. Take your choice of "Cenlaco," "Central White," "Central Black" or Spang EMT with the SPANGLEAM finish—all at your service.

SPANG CONDUIT

SPANG-CHALFANT
Division of The National Supply Company
GENERAL SALES OFFICE:
PITTSBURGH 30, PA.
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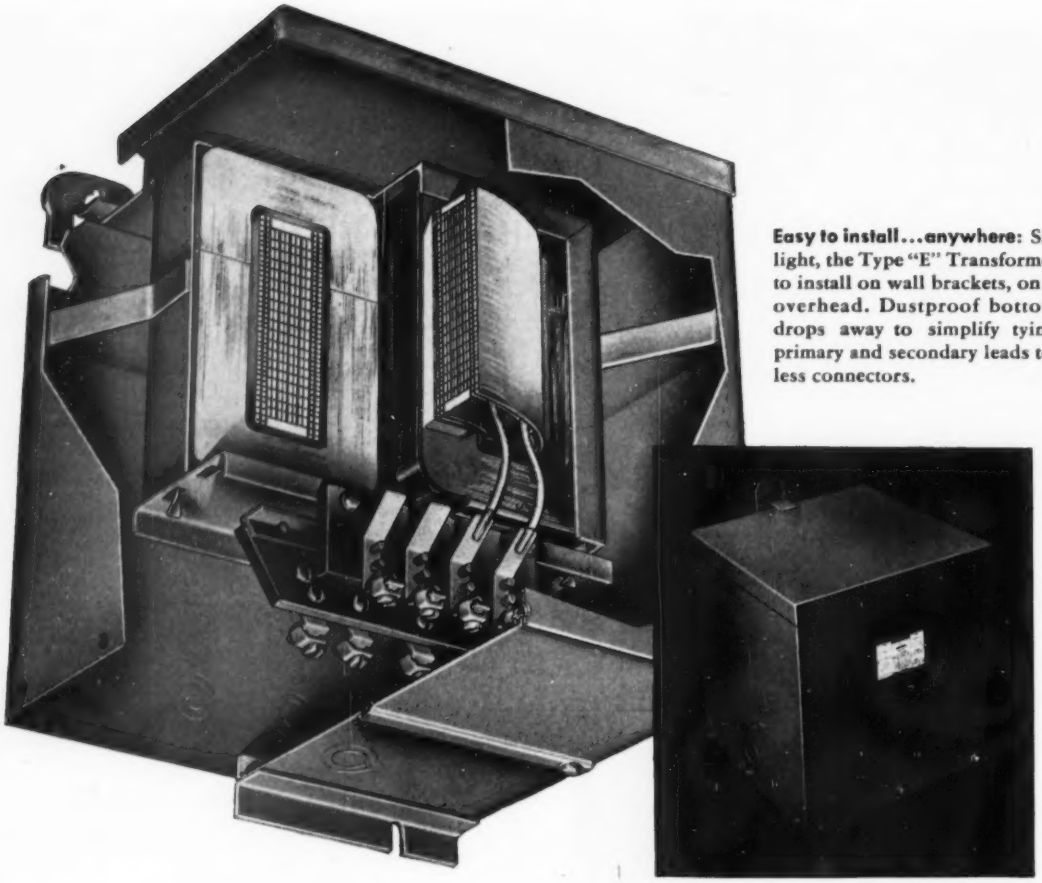


Easy to install...anywhere: Small and light, the Type "E" Transformer is easy to install on wall brackets, on posts, or overhead. Dustproof bottom panel drops away to simplify tying in of primary and secondary leads to solderless connectors.

NEW totally-enclosed dry-type transformers ...safe, economical for dusty areas!

Here's a problem that the new Westinghouse Type "E" was designed for:

If you've been forced to mount transformers outside your plant away from lint, dirt or dust-laden areas, you've paid a high price for power . . . because long secondary runs cause excessive line losses and poor voltage regulation.

Now, you can install new Westinghouse Type "E" Transformers close to the machines they serve. By shortening secondaries, you improve regulation, get increased production for your existing equipment.

Since the Type "E" is a totally-enclosed and non-ventilated dry-type transformer, it is suitable for all but the most hazardous or explosive conditions. Through the use of Class H insulation, it is small and light . . . easy to install anywhere.

You'll find Westinghouse Dry-Type Transformers offer an economical answer to your electrical distribution problems. The Type "E" is available from 3 to 22 kva, single phase, 600 volts and below. Further information is contained in booklet B-5812. Get a copy from your Westinghouse representative, or write to Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-70691

YOU CAN BE SURE...IF IT'S

Westinghouse

CRESCENT

NEW IMPROVED GRAY

CRESFLEX

NON-METALLIC SHEATHED CABLE

CRESFLEX is the most suitable and lowest cost interior wiring system for all residential, farm and rural buildings. Here are the reasons why—

CLEAN OUTSIDE SURFACE. The outside is finished with a paint. On sizes #14 and #12, this paint is gray to prevent the marking of walls.

LASTING QUALITY. A rot-proof thoroughly saturated fiberglass overall braid is used.

CLEAN INDIVIDUAL CONDUCTORS. A treated paper dam prevents saturant from reaching paper-wrapped conductors.

EASY WORKING, because paper Armor pulls off easily and the Thermoplastic insulation strips free and clean.

CRESFLEX is available from your ELECTRICAL WHOLESALER'S stock.

CRESCENT

OVER 70 YEARS EXPERIENCE

WIRE & CABLE

CRESCENT INSULATED WIRE & CABLE CO.

TRENTON, NEW JERSEY

SORGEL
AIR-COOLED
Dry-Type
TRANSFORMERS

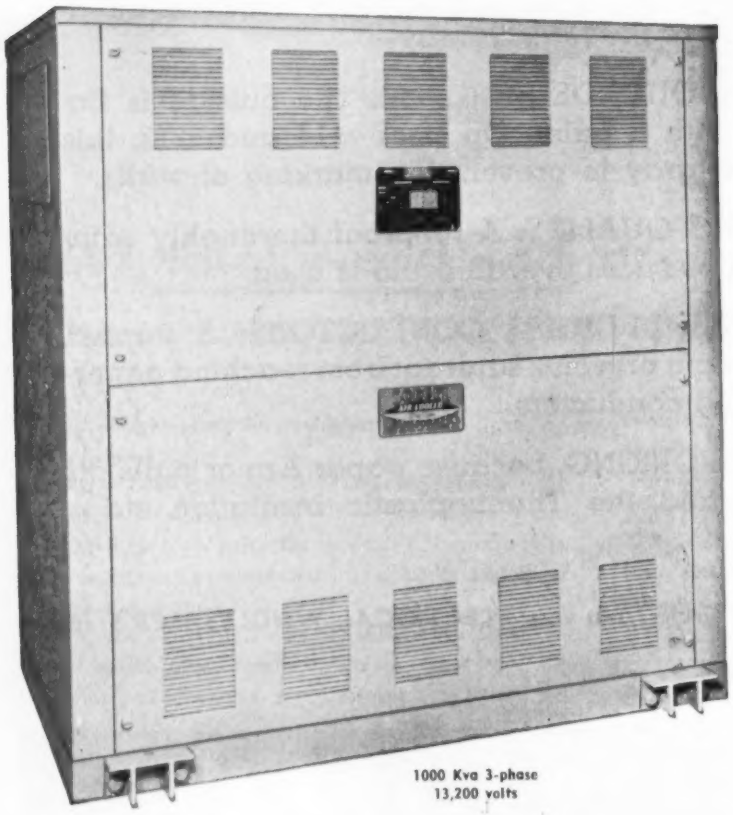
Accepted Quality

Complete Line

¼ to 1500 Kva single phase. 1 Kva to 3000 Kva 3-phase, 2–phase, and phase changing. All voltages up to 15,000 volts.

Also Substations, Special Transformers, Reactors

Accepted by Engineers, Contractors, U. S. Government, as Time-Tested and Top Quality



1000 Kva 3-phase
13,200 volts

¼ Kva
single phase
480/240 to
240/120 volts

100 Kva single phase

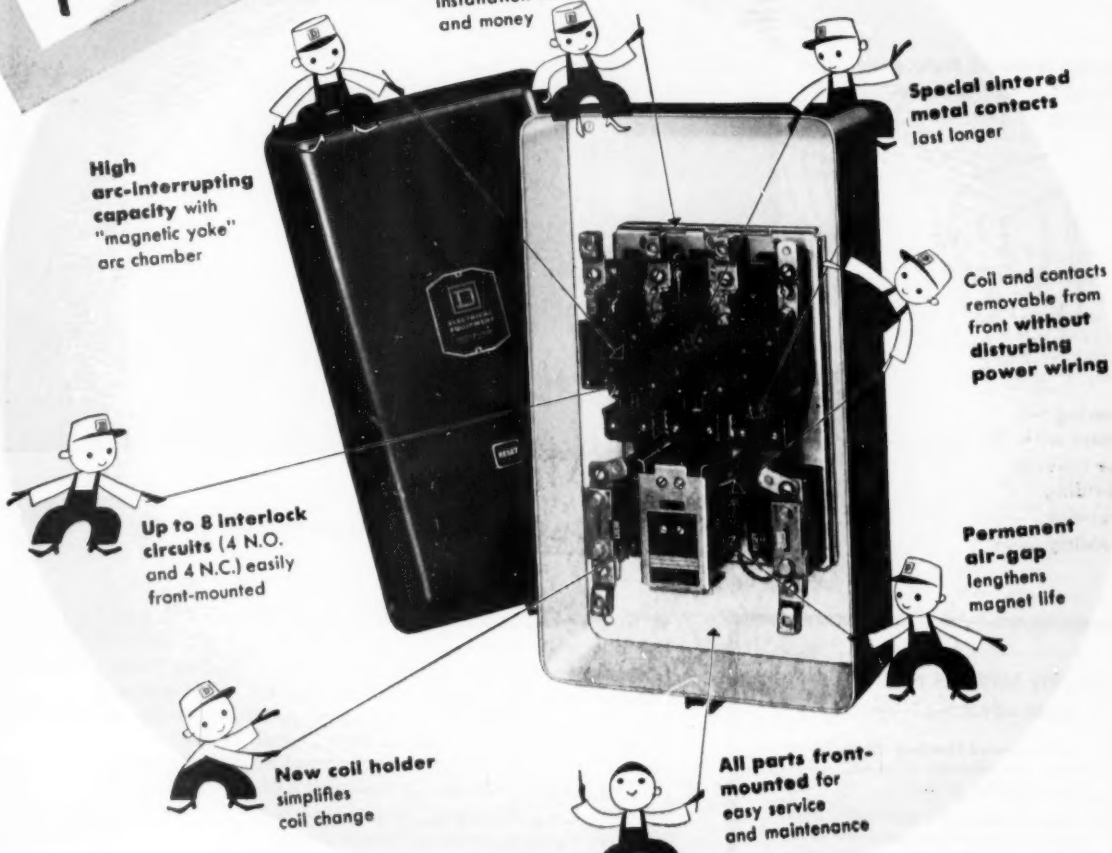
Sales Engineers in Principal Cities

SORGEL ELECTRIC CO., 836 West National Ave., Milwaukee 4, Wis.

Pioneers in the development and manufacturing of Air-Cooled Dry-Type Transformers — Over 35 years

NEW Square D Size 4 Starter

Feature-packed!



"Hook-on" base design saves installation time and money

Special sintered metal contacts last longer

High arc-interrupting capacity with "magnetic yoke" arc chamber

Coil and contacts removable from front **without disturbing power wiring**

Up to 8 interlock circuits (4 N.O. and 4 N.C.) easily front-mounted

Permanent air-gap lengthens magnet life

New coil holder simplifies coil change

All parts front-mounted for easy service and maintenance

The highest degree of accessibility, flexibility and compactness—with no sacrifice of performance and long life. That's Square D balanced design—and you'll find it in every size Square D starter.

"Off-the-Shelf" Parts Kits, another Square D convenience feature, make normal maintenance easier than ever. Each kit contains parts to replace all load contacts and finger springs. Electrical interlocks also available in kit form.

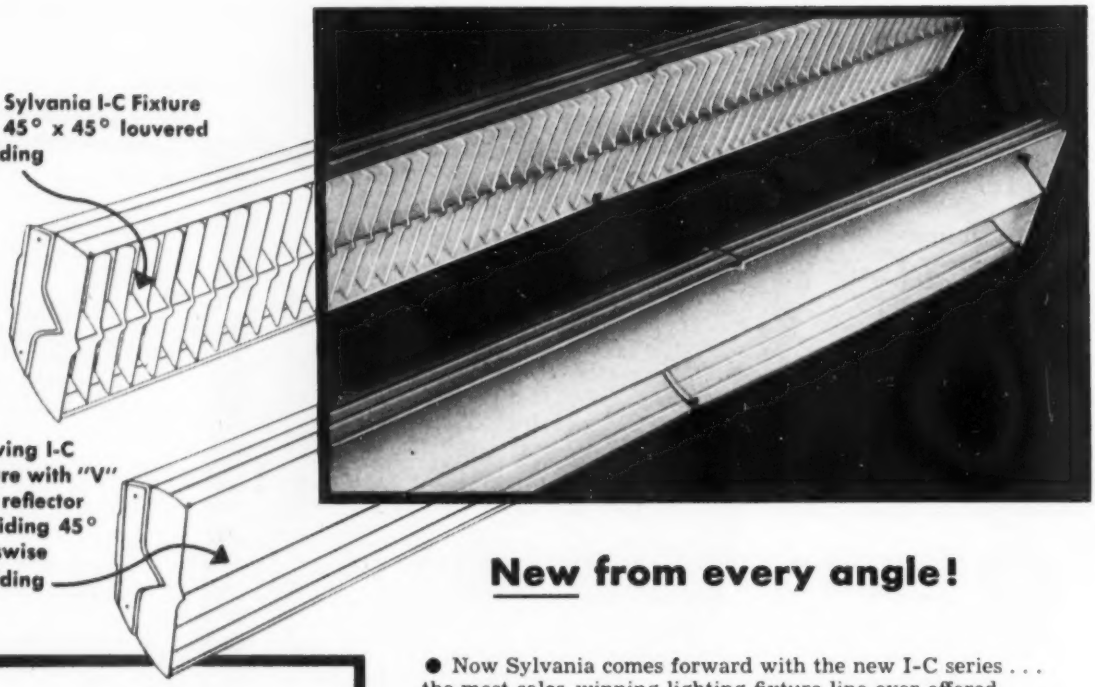
Write for Bulletin 8536, Square D Company, 4041 North Richards Street, Milwaukee 12, Wisconsin

ASK YOUR ELECTRICAL DISTRIBUTOR FOR SQUARE D PRODUCTS

SQUARE D COMPANY

1903 · 50 YEARS OF DESIGN LEADERSHIP · 1953

Sylvania Announces! A New Industrial-Commercial Fluorescent Fixture Line!



New from every angle!

● Now Sylvania comes forward with the new I-C series . . . the most sales-winning lighting fixture line ever offered.

It's another high quality Sylvania line, including today's most wanted features. Amazingly versatile, too, with 4, 5, and 8 foot units specifically designed to meet the lighting needs of offices, stores, schools and factories. Ideal for critical seeing tasks such as those encountered at printing plant composing stones or in the machining of specular metals.

And, it's a right-priced line to help you win contracts in both *industrial and commercial applications.*

Remember, this Sylvania I-C line is designed, built and tested and *fully guaranteed* for one year by Sylvania. For detailed information see your Sylvania representative or write directly to: Sylvania Electric Products Inc., Dept. 3L-2110, 1740 Broadway, New York 19, N. Y.

Quality built and packed with these advanced features:

45° x 45° Louvered Shielding—Direct Glare is kept to a minimum when 45° x 45° louver shielding is used.

60%-40% Distribution — Distribution from I-C fixtures is 60% downward and 40% upward, providing a strong direct component for high levels of illumination.

Versatile and rugged, too! — Channels are die-formed of 20-gauge steel. Made with extra knockouts to provide flexibility of installation. Designed for individual or continuous-row installations, pendant or surface mounting. Metal parts Bonderite treated to resist deterioration. Channels, louvers and steel panels finished in Sylvania's high-temperature baked Miracoat, providing 86% reflectivity.

T-17 Low Brightness Unit — The I-C line has been designed to accommodate the 40-watt 60-inch T-17 low-brightness lamp, meeting the need for a unit with minimum shielding. Combines low brightness, comfortable illumination with high efficiency and easy maintenance.

SYLVANIA

LIGHTING • RADIO • ELECTRONICS • TELEVISION

In Canada: Sylvania Electric (Canada) Ltd.
University Tower Building, St. Catherine Street, Montreal, P. Q.

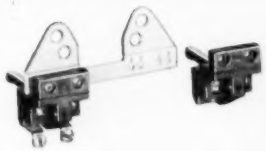
EXTRA AUXILIARY CONTACTS

for ALL Allen-Bradley Starters . . . Sizes 0 to 7

Auxiliary Contacts—Sizes 0 & 1

NOW . . . it's easy to add auxiliary contacts to A-B solenoid starters to operate extra relays, pilot lights, or other accessories. Just follow the steps shown below.

Bulletin 895 auxiliary contacts come in forms to fit all sizes of starters . . . with either single pole normally open, normally closed, or normally open-normally closed contacts. They can be added to any A-B starter in stock or in service.



Auxiliary Contacts—Sizes 2 & 3

ADD ONE OR TWO AUXILIARY CONTACTS TO ANY A-B SOLENOID STARTER

Bulletin 709 Size 0 starter with auxiliary lock-in contact

Bulletin 709 Size 0 starter with one extra auxiliary contact

Bulletin 709 Size 0 starter with two extra auxiliary contacts

SIZE 0 STARTER

One or two extra auxiliary contacts can be mounted on Size 0 arc hood. Terminals are easily accessible from front. Rugged—simple—trouble free.

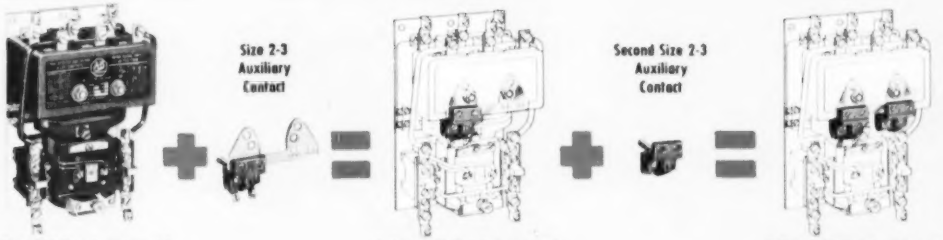
Bulletin 709 Size 1 starter with auxiliary lock-in contact

Bulletin 709 Size 1 starter with one extra auxiliary contact

Bulletin 709 Size 1 starter with two extra auxiliary contacts

SIZE 1 STARTER

One or two extra auxiliary contacts can be mounted on Size 1 arc hood. Terminals are accessible from front. Existing wiring not disturbed in any way.



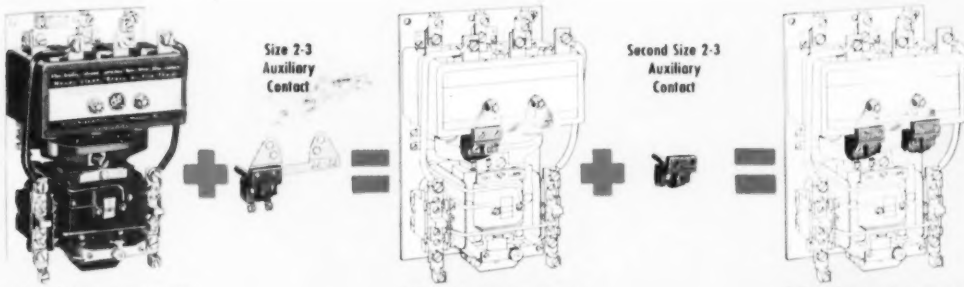
Bulletin 709 Size 2 starter with auxiliary lock-in contact

Bulletin 709 Size 2 starter with one extra auxiliary contact

Bulletin 709 Size 2 starter with two extra auxiliary contacts

SIZE 2 STARTER

Mounting plate will hold one or two extra Size 2-3 auxiliary contacts. It is attached to starter using existing arc hood threaded studs and lock nuts. Solenoid plunger of starter actuates the auxiliary contacts.



Bulletin 709 Size 3 starter with auxiliary lock-in contact

Bulletin 709 Size 3 starter with one extra auxiliary contact

Bulletin 709 Size 3 starter with two extra auxiliary contacts

SIZE 3 STARTER

The Size 2-3 mounting plate will also fit the Size 3 arc hood and support one or two auxiliary contacts. Easy to install and simple to operate. Trouble free performance is guaranteed. No contact maintenance.

Contact arrangements are readily changed from normally open to normally closed, or vice versa. This flexibility opens new possibilities for applying Allen-Bradley contactors and starters to automatically controlled equipment.

Allen-Bradley Co.
1316 S. Second St., Milwaukee 4, Wis.

A-B Quality

ALLEN-BRADLEY

MOTOR CONTROL

8-53-MR

MAKE YOUR OWN TERMINAL STRIPS

with these handy

BULLETIN 892 TERMINAL BLOCKS

EASILY MADE UP IN ANY LENGTH TO MEET YOUR TERMINAL STRIP SPECIFICATIONS

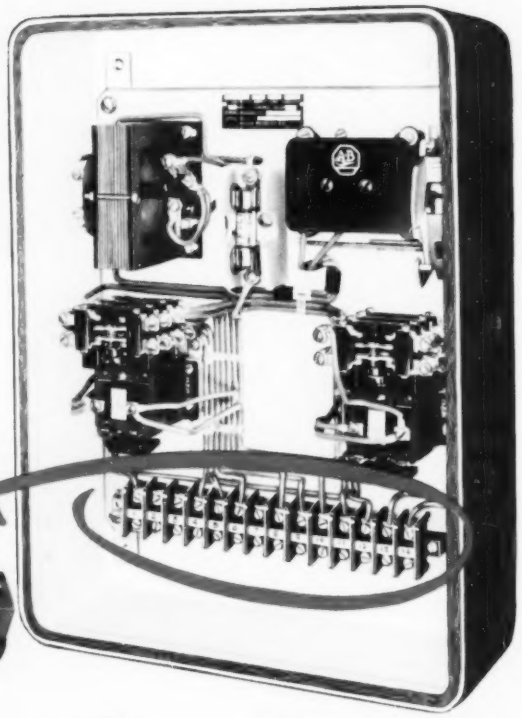
Bulletin 892 terminal blocks interlock in perfect alignment to provide the exact number of terminals for any panel board. There are no excess terminals—hence, no waste of panel space. The required terminal strip can be assembled quickly and mounted on the panel with hold-down bolts. Plastic barriers separate the clamp-type terminals which have lock washers.

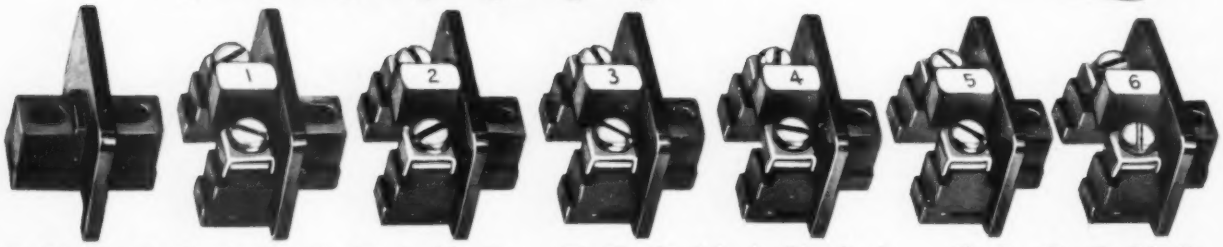
One end block and any number of terminal blocks may be hooked together. In general, every 13th block is used to secure a long terminal strip to the panel.

AVAILABLE IN TWO CURRENT RATINGS
15 AMPERES—25 AMPERES

Dimensions of Bulletin 892 Terminal Blocks

Ampere Rating	Width	Height	Over-all Length of 10 Blocks
15	1½"	1"	7"
25	1⅞"	1⅛"	8⅛"





INTERLOCKING TERMINAL BLOCKS

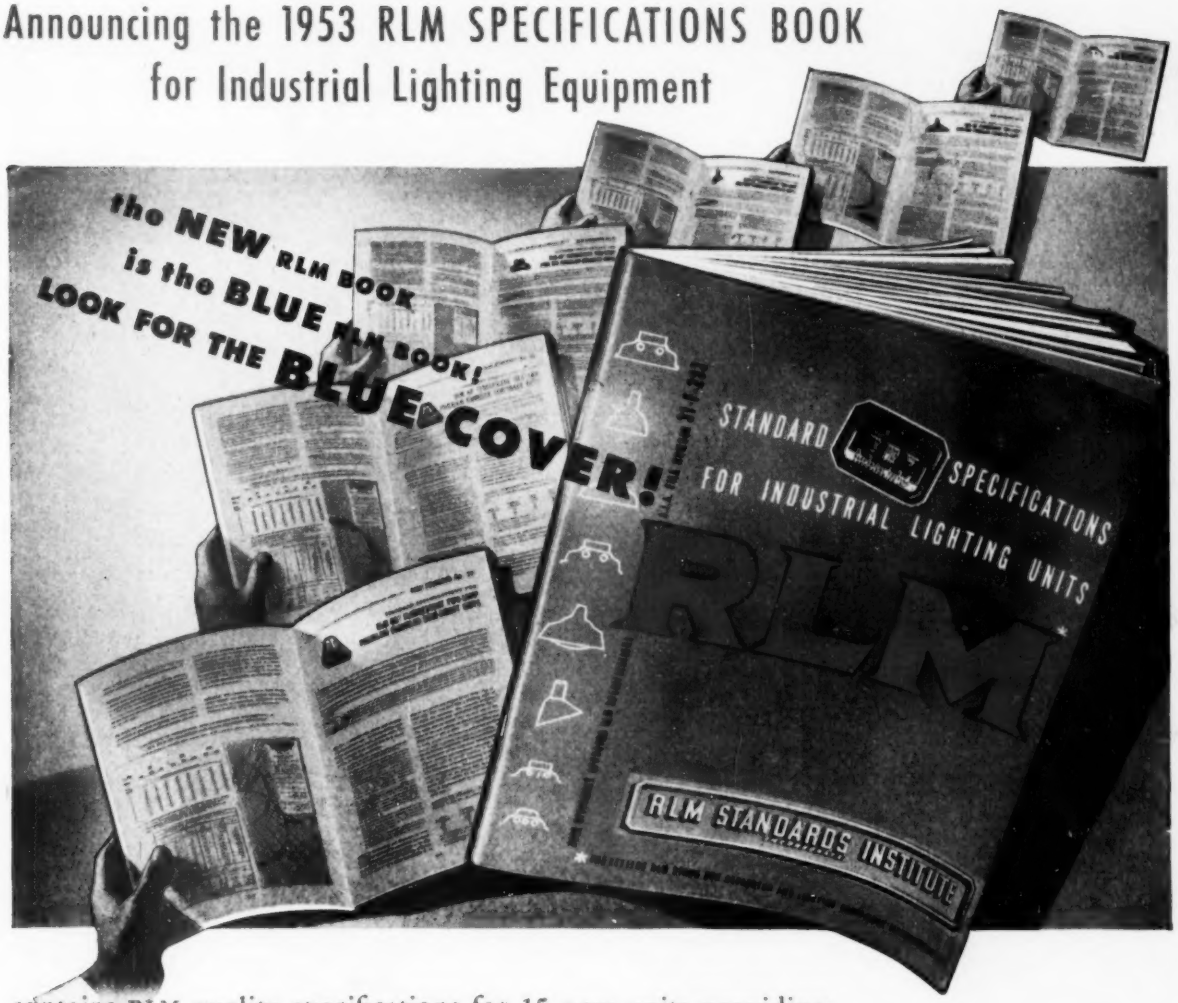
ALLEN-BRADLEY
QUALITY
MOTOR CONTROL

A-B Quality

Allen-Bradley Co.
1316 S. Second St., Milwaukee 4, Wis.

8-53-MR

Announcing the 1953 RLM SPECIFICATIONS BOOK for Industrial Lighting Equipment



contains RLM quality specifications for 15 new units providing
GREATER UPWARD LIGHT for even better industrial seeing conditions
plus IMPORTANT REVISIONS AND ADDITIONS to the other 68 RLM Specifications

Your copy of this newly-published reference book on industrial lighting equipment is ready now at no cost or obligation. Tens of thousands of architects, lighting engineers, electrical contractors, industrial executives and others have for 10 years relied on the RLM Specifications Book as an invaluable aid in measuring illumination, construction and performance standards, which are basic to lighting equipment efficiency, economy and ease of maintenance.

This new 1953 "blue-cover" edition is even more useful and valuable. It incorporates long-awaited specifications for 48", 72" and 96" RLM Semi-Direct Fluorescent Units. The new specifications cover 15 variations of this new "Upward Component" unit which directs from 20 to 30% of the light upward.

Altogether, this greatly-enlarged 1953 RLM Specifications Book has 52 pages, covering 83 different types and sizes of RLM-certified incandescent, fluorescent and mercury industrial lighting units. All specifications have been brought up-to-date in accordance with latest illuminating engineering developments.

Whether you buy, sell or specify industrial lighting equipment, you are invited to send for your FREE copy of the 1953 "blue-cover" edition of the RLM Specifications Book. Address request on your letterhead, please, to: RLM STANDARDS INSTITUTE, SUITE 819 326 W. Madison Street, Chicago 6, Illinois.

RLM STANDARDS INSTITUTE
INCORPORATED
The letters RLM stand for Reflector and Lighting Equipment Manufacturers

R291

Rockwell Report

NATIONAL
EASY TO EXTEND —

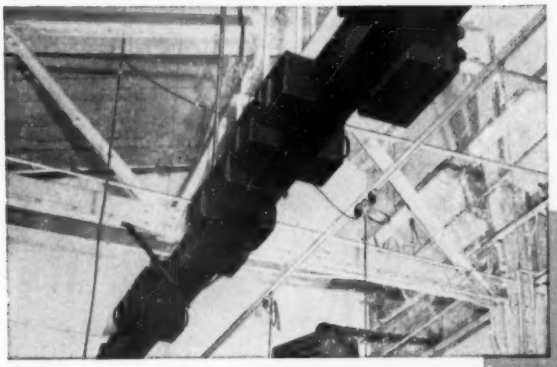
Rockwell Manufacturing Company, Pittsburgh, Pa. discovered early that National Electric "Plug-In" (IPI) Busway provides an *easily accessible and flexible* electrical distribution system. Manufacturers of gas and liquid measurement and control equipment, Rockwell reports their original "Plug-In" Busway system, in use for more than 10 years, was relocated several times at the Pittsburgh plant, then removed entirely and sent to other plants for installation. Yet the busway was "fully salvable and good as new, with no need of any kind of repair."

This flexibility and economy are the main reasons National Electric Busway was specified when production facilities were expanded about 2 years ago at the Pittsburgh DuBois Division. NE Busway now provides power for the many machines in the valve plate, press and machining lines, tool room and grinding department. Here's what Chief Electrician L. E. Johnston reports on the installation:

"The busway system was laid out with all foreseen extensions planned for. We've found, not only here at DuBois but in other of the Company's plants as well, that through the use of IPI, machines on the production line may be plugged in, disconnected, or relocated at any time without shutting down the production line. Also the fact that it can be extended, or relocated, as production requirements change, is as big an advantage as the fact that every foot of the bus is usable. Long tap runs are eliminated through the fact that feed-in and tap-off fittings, with plug-in openings staggered on two sides of IPI lengths, permit insertion of devices convenient to equipment."

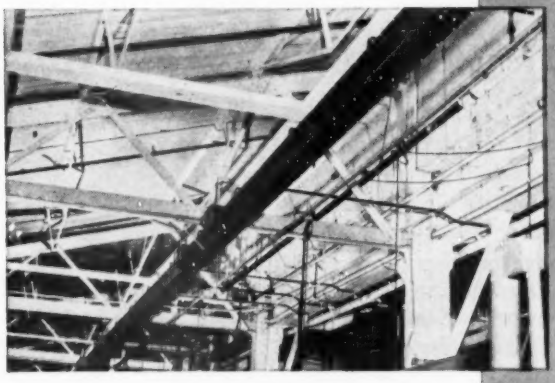
Rockwell Report

ELECTRIC BUSWAY... IS...
EASY TO RELOCATE— *Completely* SALVABLE

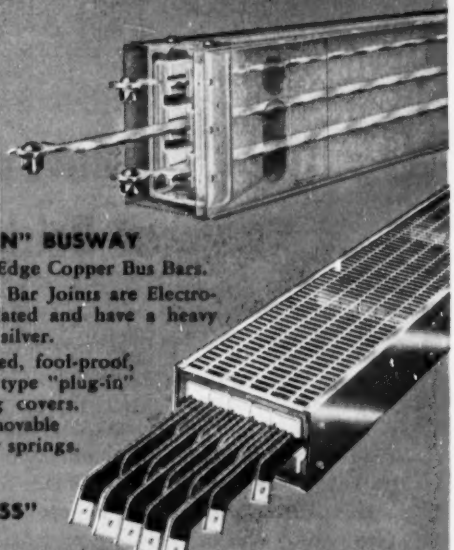


PLUG-IN DEVICES on National Electric IPI Busway provide completely flexible power to grinding room.

PROVISION FOR ELECTRICAL EXPANSION at Pittsburgh DuBois Division is made through "tees" from main runs of National Electric Industrial Feeder Busway, directed towards bays in plant where additional manufacturing machinery will be located. Run shown in this picture is 800-ampere, 3 phase, 230-volt A.C.



NATIONAL ELECTRIC "PLUG-IN" BUSWAY permits plugging-in, disconnection or relocation of machines in tool room production line, without shutting down entire line while work is in progress.



"PLUG-IN" BUSWAY

- Rolled Edge Copper Bus Bars.
- All Bus Bar Joints are Electro-silver-plated and have a heavy coat of silver.
- Simplified, fool-proof, sliding type "plug-in" opening covers. No removable parts or springs.

"LO-LOSS" FEEDER BUSWAY

- "Lo-Loss" Feeder Busway—for use with "Plug-In" Busway—designed for transmission of electrical current up to 4000 Amperes at 600 Volts or less.

Write for complete details

Listed by Underwriters' Laboratories, Inc.

EVERYTHING IN WIRING POINTS TO

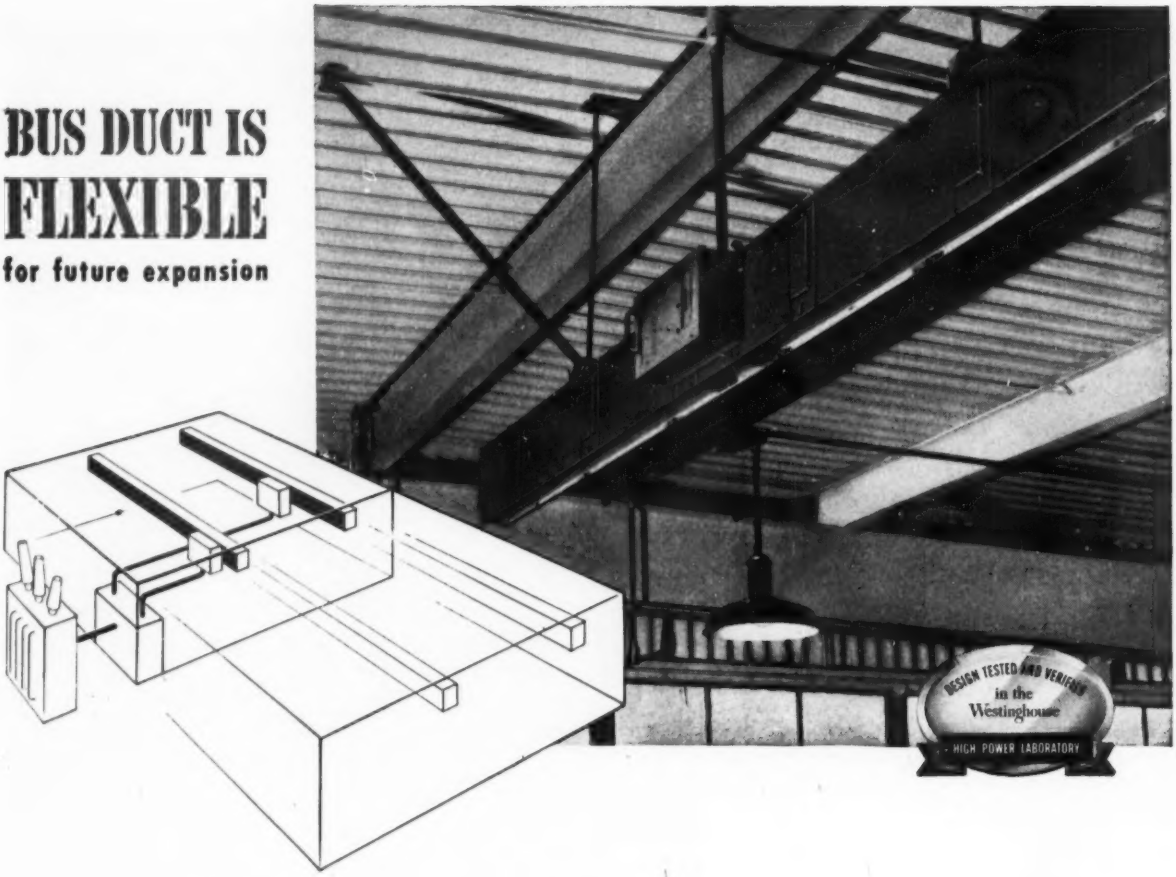
National Electric Products

PITTSBURGH, PA.

3 Plants • 7 Warehouses • 34 Sales Offices

BUS DUCT IS FLEXIBLE

for future expansion



BUS DUCT assures fast, low-cost power expansion at Bridgwater Machine Company

Future expansion won't upset power distribution in the new plant of the Bridgwater Machine Company at Akron, Ohio.

Two 180-ft. runs of 400 ampere Westinghouse Plug-in Bus Duct will be doubled in length to provide power for a proposed plant addition.

Installation will be fast, simple. End closers (see photo) will be removed; prefabricated duct sections, assembled and hung easily with cantilever hangers, will extend the bus duct runs into the new building addition. There will be no rewiring—no wasted equipment—minimum service downtime. The result: unified, flexible power distribution *at lower installed cost than cable and conduit, or wireway.*

The Bridgwater management also finds that power plug-ins every foot facilitate tie-ins and change-overs of machines.

Up to 5000 amperes, Westinghouse Bus Duct has greater current-carrying capacity than any other distribution method. Four types are available to handle all load conditions and service needs.

Call your Westinghouse Representative for complete details or write for B-5835, Westinghouse Electric Corp., P. O. Box 868, Pittsburgh 30, Pa.

J-30145

YOU CAN BE **SURE**...IF IT'S

Westinghouse

APPARATUS DISTRIBUTOR WESTINGHOUSE W

Protect yourself against

1 HIGH REPLACEMENT COSTS

2 HIGH LIGHT COSTS

3 HIGH MAINTENANCE COSTS

CBM CERTIFIED by ETL

Here's why the initials "CBM" on a Fluorescent Ballast are important to you

Q. What do the initials "CBM" stand for?

A. "CBM" stands for CERTIFIED BALLAST MANUFACTURERS. Nine of the country's leading manufacturers of fluorescent ballasts comprise the CBM group.

Q. What does "CERTIFIED" mean?

A. It means that ballasts carrying this diamond-shaped shield have been built to rigid specifications designated by CERTIFIED BALLAST MANUFACTURERS. It means that Electrical Testing Laboratories, Inc., has periodically tested these ballasts and found they meet or exceed the exact specifications designated by CBM.

Q. What's the need for specifications?

A. Ballasts are the heart of fluorescent lighting. CBM specifications make certain the ballasts provide best possible performance for the lamps they operate.

Q. How do CERTIFIED BALLASTS benefit you?

A. When fluorescent lamps do not perform in accordance with published ratings, low quality or improperly designed ballasts may be the cause. However, most lamp manufacturers waive this possibility if the ballasts involved are CERTIFIED.

The CBM Shield is their assurance that the ballast is delivering proper electrical values to their fluorescent lamps.

CBM specifications protect the public interest because they provide:

FULL LAMP LIFE — **RATED LIGHT OUTPUT**
LONG BALLAST LIFE — **FREEDOM FROM OVERHEATING**
QUIET, TROUBLE-FREE OPERATION

Write for complete information on the types of CERTIFIED CBM BALLASTS available from each participating manufacturer.

Participation in the CERTIFIED CBM BALLAST program is open to any manufacturer who complies with the requirements of CERTIFIED BALLAST MANUFACTURERS.

CERTIFIED BALLAST MANUFACTURERS

Makers of Certified Ballasts for Fluorescent Lighting

2116 KEITH BLDG., CLEVELAND 15, OHIO

Worker on Brooklyn Bridge is applying U.S. Holdtite Friction Tape over U.S. Uskorona splicing compound.

Splicing with "U. S." Tape on the Brooklyn Bridge

U. S. Uskorona and U. S. Holdtite® Tapes selected for new lighting system

Panoramic shot of Brooklyn Bridge's new lighting job.

With the remodeling of the main span and approaches of the Brooklyn Bridge by the New York City Department of Public Works, a new lighting system was installed. To insure that splices would have and would *retain* the same dielectric properties as the cables they covered, engineers selected U. S. Uskorona splicing compound, plus U. S. Holdtite Friction Tape. Uskorona is the best splicing compound made because it's the only one that protects against *both* ozone and moisture.

These United States Rubber Company products can easily withstand New York's severe extremes of weather conditions. For example, tests of four leading brands proved that Uskorona was the only one unharmed after 4 hours' exposure to ozone. Even when the exposure was extended to 500 consecutive hours, no damage occurred.

Naturally, these tapes splice easily, fuse quickly without heat or pressure. Electricians like the way the tape "handles". A staff of engineers is at every one of our 25 District Sales Offices to solve any industrial rubber problem. Or write to address below.

Applying Uskorona to a solderless connector on a tap off to the lighting installation.

U.S.RUBBER
SERVING THROUGH SCIENCE

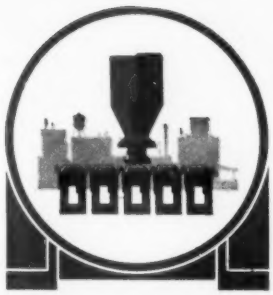
"U.S." Research perfects it
"U.S." Production builds it
U.S. Industry depends on it

UNITED STATES RUBBER COMPANY

MECHANICAL GOODS DIVISION • ROCKEFELLER CENTER, NEW YORK 20, N. Y.

Hose • Belting • Expansion Joints • Rubber-to-metal Products • Oil Field Specialties • Plastic Pipe and Fittings • Grinding Wheels • Packings • Tapes Molded and Extruded Rubber and Plastic Products • Protective Linings and Coatings • Conductive Rubber • Adhesives • Roll Coverings • Mats and Matting

Metal Working



Food Processing

Grain Handling

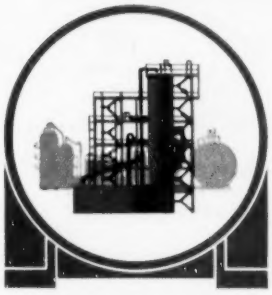
Electric Motors

for every industry

When you need electric motors . . . in any rating, or frame type . . . one or a thousand . . . *always* look for the Fairbanks-Morse Seal. For over 120 years it has stood for the finest in manufacturing integrity to *all* industry.

Fairbanks, Morse & Co., Chicago 5, Illinois.

Chemical Processing



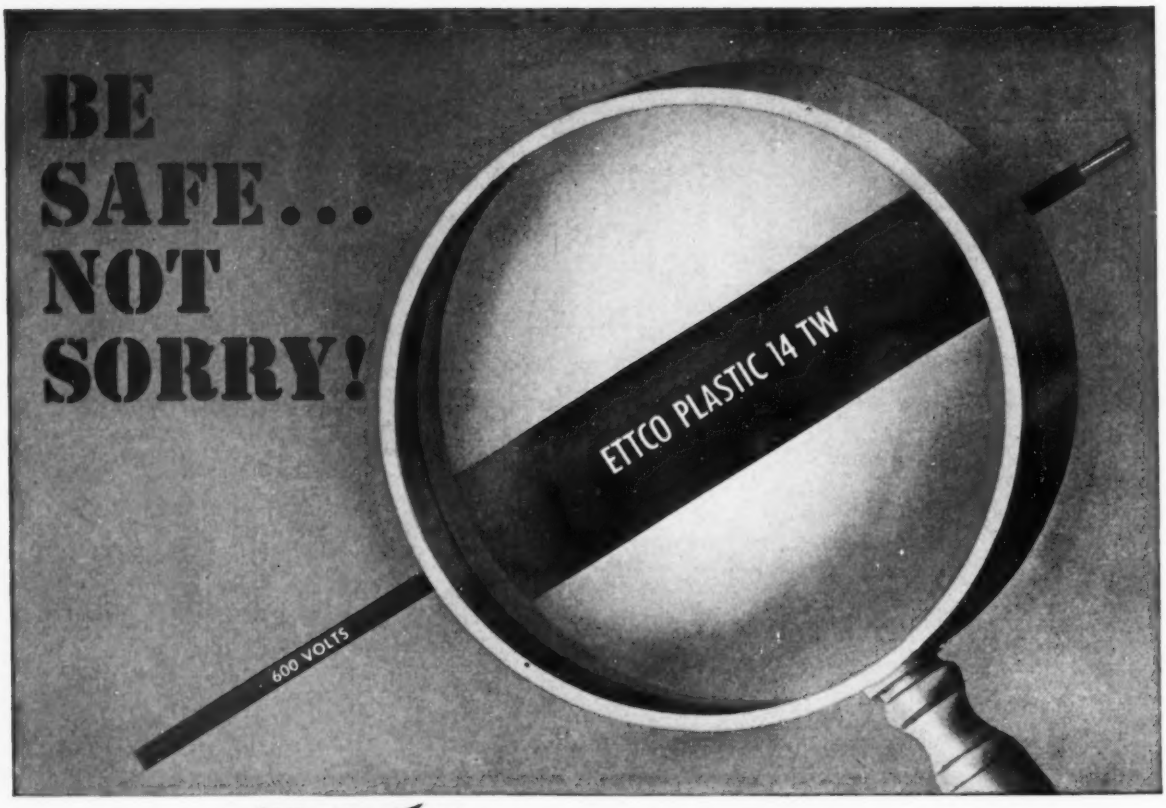
Petroleum Refining

Fairbanks-Morse totally-enclosed, fan cooled motor—in a complete horsepower range.

FAIRBANKS-MORSE

a name worth remembering when you want the best

ELECTRIC MOTORS AND GENERATORS • DIESEL LOCOMOTIVES AND ENGINES • RAIL CARS • PUMPS • SCALES • HOME WATER SERVICE EQUIPMENT • FARM MACHINERY • MAGNETOS



SPECIFY Ettco TW BUILDING WIRE

(newest member of the Ettco family!)

- small diameter Thermoplastic Wire resists severe exposure!
- lubricated for easy pulling!
- easiest, cleanest stripping ever!
- saves initial and maintenance costs . . . installation time!
- laboratory tested and inspected!
- packaged in handy cartons!

Representatives and warehouses in the following principal cities:

Atlanta, Ga.	Denver, Col.	Louisville, Ky.	Portland, Ore.
Boston, Mass.	Detroit, Mich.	Minneapolis, Minn.	San Franscico, Cal.
Cleveland, O.	Greensboro, N. C.	New Orleans, La.	Seattle, Wash.
Chicago, Ill.	Houston, Tex.	New York, N. Y.	St. Louis, Mo.
Dallas, Tex.	Los Angeles, Cal.	Philadelphia, Pa.	Syracuse, N. Y.
		Pittsburgh, Pa.	Washington, D. C.

SOLD THROUGH ELECTRICAL WHOLESALERS ONLY

OTHER PREMIUM quality electrical products by

Ettco

- Bushed Armored Cable
- Non-metallic Sheathed Cable
- Flexible Steel Conduit
- Service Entrance Cable

UL

ETTCO Wire & Cable Corporation

General Offices: 46-50 Metropolitan Avenue • Brooklyn 37, New York
Plant: 75 Onderdonk Avenue • Brooklyn 37, New York

Electrical Contractors Nationwide

SEE THE ADVANTAGES IN...

Acusti-Luminus Ceilings

KLINE'S Women's Apparel store, Detroit, Mich. French Electric Co. installed this ACUSTI-LUMINUS CEILING one of the largest of its type installed in a department store. The modular layout of the corrugated plastic panels is achieved by cross tracks at the columns. Spotlight sections at the columns provide additional punch lighting for displays.

More than 2,000 *ACUSTI-LUMINUS CEILING* INSTALLATIONS IN 35 STATES.

Many electrical contractors have been quick to appreciate our keeping ACUSTI-LUMINUS CEILINGS in their jurisdiction. Good additional business comes with ceiling installations. Get them started in your community. Get Profit Back in the Lighting Business!

Each ACUSTI-LUMINUS CEILING is a figured engineering job with full protection for its originator.

General Office of the DORMEYER CORP., Chicago, manufacturers of the well known small appliances. Transformed from rough factory loft space to this elegant office with the help of an ACUSTI-LUMINUS CEILING which provides soft even illumination, plus acoustical correction with ACUSTI-LOUVERS or sound baffles.

Kil-Bar Electric Co., of Chicago was the electrical contractor.

A SUPER MARKET with SUPER LIGHTING, Poughkeepsie, New York . . . A good example of what an ACUSTI-LUMINUS Ceiling can do to change the entire appearance. This store was once rough factory area occupied by the Pepsi-Cola Bottling Company. Girders, beams and unsightly pipes are now concealed from view with this New development in illumination. Note spotlight sections that have been inserted in Luminous Ceiling to accentuate meat display.

O'Shea Electric of Poughkeepsie, N. Y. was the electrical contractor of this installation.

Write for Free Brochure

LUMINOUS CEILINGS INC.

2500 W. NORTH AVE. CHICAGO 47, ILL.

• • DISTRICT OFFICES • •

NEW YORK • BOSTON • PHILADELPHIA • WASHINGTON, D. C. • CLEVELAND • DETROIT • LOS ANGELES • SAN FRANCISCO

easy to splice

Splicing Okolite-Okoprene rubber-insulated shielded cables is a simple and easy operation. No lead wipe is required, nor is a filling compound necessary. The fewer man hours required mean a lower cost splice and more rapid installation. Important, too, moisture present in underground installations will not affect the tapes used in this permanent splice. Ease of splicing is another reason why the switch today is to Okolite rubber-insulated cables for high voltage use.

• Splicing Okolite-Okoprene at a large southern chemical plant.

WHY THEY'RE SWITCHING TO OKOLITE

There is a distinct trend among industrials and public utilities toward Okolite rubber-insulated cables for high voltage use.

ADVANTAGES

1. Lighter and easier handling.
2. Eliminates sheath corrosion and fatigue.
3. Simplifies splicing and terminating.
4. Moisture does not affect the insulation.
5. No oil migration at high temperatures or elevations.
6. Flexibility simplifies installation.

APPLICATIONS

1. Transmission and distribution circuits.
2. Generator and transformer leads.
3. Vertical risers and shaft cables.
4. Submarine power cables.
5. Portable substation cables and test leads.
6. X-ray cables.

Send for this 128-page manual on rubber-insulated high voltage cable. It provides current carrying capacity tables, dimensional data, engineering information and installation procedures, complete instructions and detailed drawings for splices and terminations. Write for Bulletin EC 1075 on your letterhead to The Okonite Company, Passaic, New Jersey.

OKONITE OKONITE SINCE 1878 *insulated cables*

1882

Washington Report

Optimistic business forecasts are heard on all sides in Washington, including another boom period ahead. Commerce Secretary Weeks cites rising personal income and spending as proof of economic strength. Downturns in other indicators—steel, housing, farm prices, employment, etc.—are classified as "soft spots" or "adjustments", following the shortage-marked Korean boom. These all still remain high, it is pointed out.

Administration politicos say a perpetual boom is in the making, and some top economists predict new high records for the late 1950s. Demand for more goods and services by a growing population is the principal factor. Easier credits will stimulate buying of homes, autos, appliances, and downward adjustments in prices and production will not add up to depression, these forecasters point out.

Plans for heading off any serious depression threat, being drawn up by Eisenhower's economic staff, include tax cuts, public works, and monetary manipulations, and will be turned on if business needs a shot in the arm. The congressional economic committee puts tax cuts ahead of public works.

Cooperation with business will keynote new policies of regulatory agencies as they are unveiled this fall by Securities Exchange, Federal Trade and Federal Power Commissions. With vacation, paper and staff work behind them, Eisenhower's head men are beginning to shape their programs, will reveal them at an increasing tempo.

Tax cuts next year are considered a certainty. But they will be limited to excess profits tax on December 31, this year, and individual income tax cuts averaging 10% on January 1. These add up to a $5 billion loss in revenue to the Government. With the Administration committed to a balanced budget, new methods of taxation will receive much attention for the next several months, plus a continuing study of ways and means for further reductions in Federal spending. Treasury Secretary Humphrey is still leaning to a Federal sales levy, despite Congressional opposition.

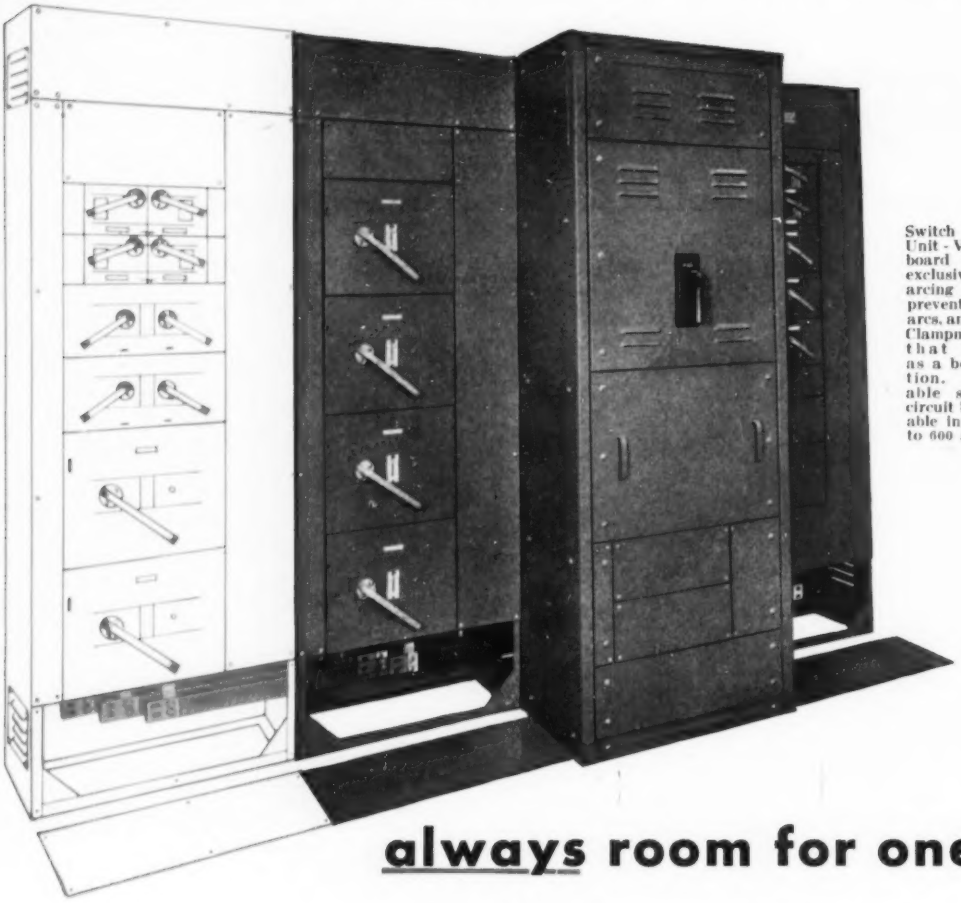
Upswing in non-farm employment was smaller than usual in August, Labor Dept. reported, when only 200,000 workers were added. However, non-farm industries employed 49.4 million workers in August, a record for this month, and 1.2 million more than August 1952. Simultaneously Census Bureau said unemployment set a new post-war low of 1.2 million workers. The labor force at 64,700,000 in July was up half a million from July last year. Construction employment has remained at near record levels, with heavy construction of commercial buildings and highways taking up slack left by decline of new housing starts.

Reduction of Federal employees through July 31 totaled about 88,000, with further layoffs still to be made. Civil Service Commission reported 2,447,200 Federal civilian employees listed as of July 31. High record was 3,769,646 in June 1945, and post-war low was 1,966,444 in June 1950.

Electric energy consumption continues to run about 10% ahead of a year ago, exceeding 8.5 billion kilowatt hours weekly on the average. Many large cities reported largest consumption on record during hottest weeks of late summer, attributed mainly to use of air conditioning, TV sets on sleepless nights, overworked refrigerators, fans, etc.

The nation's housing needs and the part Government should take in it is being investigated by a 20-man Advisory Committee on Government Housing Policies and Programs, established by Eisenhower. Slum clearance, community redevelopment, aid to public low-rent housing, mortgage insurance and financing will be included in the study.

BULLDOG UNIT-VERSAL SWITCHBOARD



Switch units in the Unit-Versal Switchboard use BullDog's exclusive Vacu-Break arcing chamber that prevents dangerous arcs, and the patented Clampmatic Contacts that hold tight as a bolted connection. Interchangeable switches and circuit breakers available in sizes from 15 to 600 amperes.

always room for one more

Get the performance and protection you need *today*, the flexibility you'll need *tomorrow*, in one compact, low-cost switchboard. BullDog Unit-Versal Vacu-Break Switchboards are engineered to your specifications — adapt or expand swiftly to fit changing power requirements.

Only a screw driver and a crescent wrench are needed to assemble, install, extend or convert these modern switchboards. Removable front plates (shown above) provide quick access to wire gutters; louver plates permit bus bars to be extended and connected easily.

BullDog's famous Vacu-Break Switch Units give you extra-safe "quick-make, quick-break" protection. Furthermore, ample space can be provided for additional switches, breakers, meters, transformers, motor controls or any other special equipment you may need.

Get complete details on this amazing switchboard that lets you budget your power expansion. Write BullDog Electric Products Company, Dept. EC 103, Detroit 32, Michigan.

® **BULLDOG**

THOROUGHBRED IN ELECTRICAL EQUIPMENT **ELECTRIC PRODUCTS COMPANY**

Curtis Whittlesey McGraw

Everybody who knows Electrical Construction and Maintenance has known Curtis McGraw, president and chairman of the Board of McGraw-Hill Publishing Company. The enduring mark of his leadership in the task of keeping business well-informed, shaping the technical development of industry, and holding the nation to an awareness of its power for greatness must remain on these pages. But it is something out of the lives of all of us that he died last month.

Born in Madison, N. J., October 13, 1895, Mr. McGraw was a graduate of the Lawrenceville School, Lawrenceville, N. J., and of Princeton University, class of 1919. At Princeton, he was president of his freshman class, captain of his varsity football team in 1919 and was active in other sports.

Mr. McGraw was active in numerous civic affairs, and was a member of the Postmaster General's recently appointed Advisory Board of the Post Office Department.

Associated with McGraw-Hill Publishing Company since 1920, when he joined the McGraw-Hill Book Company (McGraw-Hill subsidiary,) he was vice-president, treasurer and director of the Book Company from 1927 to 1950. He became vice-president and treasurer of the McGraw-Hill Publishing Company in 1943, and in February, 1950, was elected president and chairman of the Board.

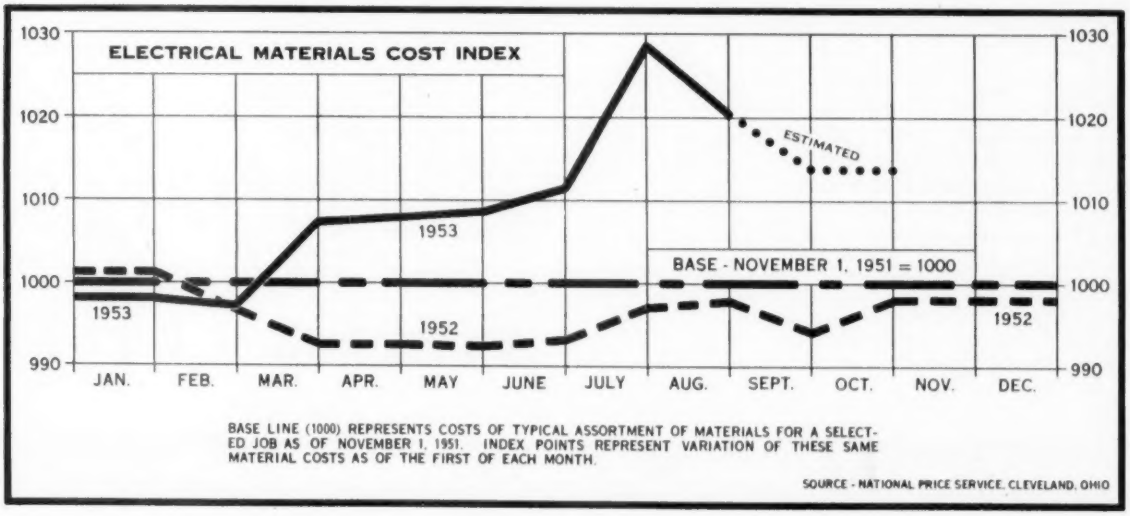
SEPTEMBER . . . *at a Glance*

BY-PRODUCTS—For their technical substance and for practical lighting application ideas the reports of the winning entries in the National Lighting Competition for Electrical Contractors (page 85) are worth careful study. The astute reader may find even more between the lines.

Take the notorious canard that "electrical contractors can't sell." Not only the winners but every entry in the competition presented a case study in straightforward sales initiative by an electrical contractor. For those who must generalize we recommend such objective testimony in place of questionable anecdotes that make the rounds of industry gossip.

It is noteworthy, too, that the big cities have no monopoly on good lighting practice. Many smaller communities were represented in the entries and among the winners.

INSPECTORS—The joint meeting of the five Sections of the International Association of Electrical Inspectors in Chicago last month celebrated the 25th anniversary of the organization with a record breaking attendance and an exceptional trade show. The concurrent release of the new 1953 revision of the National Electrical Code made the meeting one of the most active on record for the inspectors who carry a large burden of responsibility for safety. Gus Eckel and Joe McPartland covered the meetings and their story and pictures begin on page 223.



BASE LINE (1000) REPRESENTS COSTS OF TYPICAL ASSORTMENT OF MATERIALS FOR A SELECTED JOB AS OF NOVEMBER 1, 1951. INDEX POINTS REPRESENT VARIATION OF THESE SAME MATERIAL COSTS AS OF THE FIRST OF EACH MONTH.

SOURCE - NATIONAL PRICE SERVICE, CLEVELAND, OHIO

Simplex RESEARCH

WEEKS

SAVES ~~DAYS~~

of Expensive Labor

NEW SIMPLEX RHW

Carries *HEAVIER* Loads at *HIGHER* Temperatures

Once more the Simplex Laboratories have "scooped" the industry by producing the first RHW Wire to meet the new National Electrical Code. This rubber-insulated, rubber-jacketed cable is rated by the Underwriters at 75°C. (167°F.) wet or dry operation. At the present time this is the only wire so rated by them.

You might logically ask, "That's all fine, but what does it mean to me?" Very frankly, it means plenty. Suppose your conduits or ducts now are loaded to their capacity, yet you have to increase the amount of current you carry through them. You have two choices: Either you can dig up and replace your ducts with bigger ones, which is a mighty expensive proposition, or you can go "modern", and use Simplex-ANHYDROPRENE Type RHW or Simplex-ANHYDREX Type RHW. ANHYDROPRENE is for use in ducts and conduits; ANHYDREX for direct burial.

You can operate the conductors of this new wire at 75°C. (167°F.) without harming the insulation. Thus your present conduits or ducts need not be disturbed. Just pull out your old cables and pull in Simplex-ANHYDROPRENE cable with RHW insulation.

This is only one of the advantages that comes to you from using Simplex RHW insulation in ANHYDROPRENE and ANHYDREX cables. Want to know more?

We'll gladly send you farther information without obligation. If you prefer, you can get this information from your local Simplex representative.

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ELECTRICAL CONSTRUCTION AND MAINTENANCE

52nd Year—OCTOBER • 1953

Versatile Heat

ELECTRIC HEAT is a relatively expensive source of heat energy in theory. The potential in a pound of coal or a gallon of oil costs only a small fraction of its equivalent in kilowatt hours. But the simplicity, safety and ease of control that electric heat offers in practical use can far outweigh energy cost.

THE KEY TO SUCCESSFUL APPLICATION lies in exploiting the unmatched versatility of the electric heat source. For centuries man has struggled to modify natural combustion to practical use. The hot flame was enclosed. Air, water and steam became heat transfer media. But even with our present advanced heating science, precise control of temperature and quantity are cumbersome and costly whenever the required heat and application characteristics are unconventional.

AT THE EXTREMES, electric heat applies a controlled quantity of energy at a temperature almost imperceptibly above ambient, as from an electric blanket, to the sun-like temperatures of the arc furnace. It can provide a very small amount of energy at a high temperature in the surgeon's cautery or large amounts of energy at low temperature from a ceiling space heating panel. And besides being inherently versatile it is inherently easy to control.

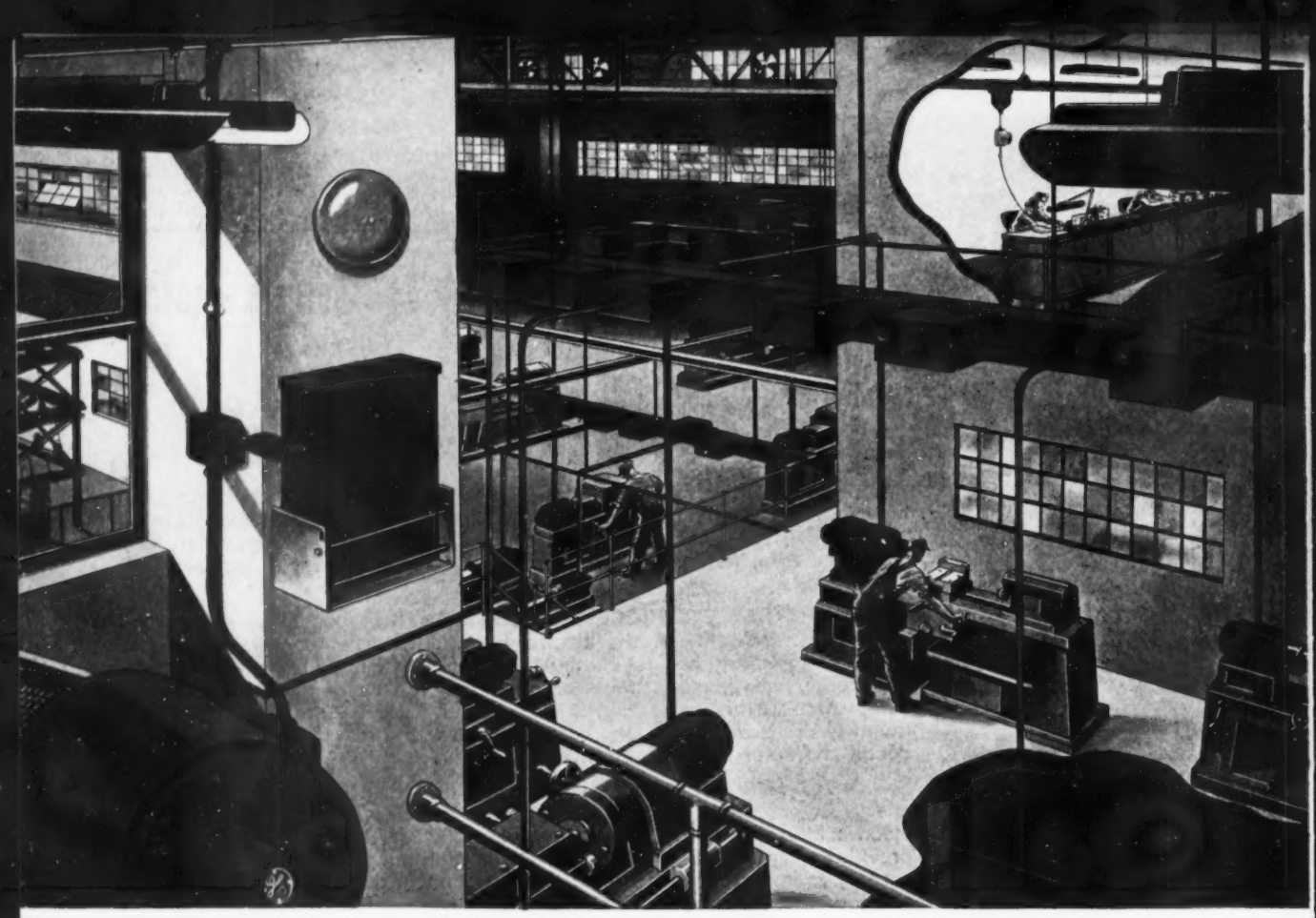
IN THE COLD NORTHERN DAIRY COUNTRY the electric milk house heater automatically guards against freezing. In the oil country, sluggish ends are speeded through pipes heated by resistance coils. The elaborate equipment of chemical plants are automatically protected by heating elements during process interruptions. Heat cables defrost refrigeration pipes, prevent structural damage, clear snow from roadways and safeguard valves. Other devices retard the cooling of delicate ceramics, control temperature in critical processes or provide comfort in a remote gate house.

IN ALL SUCH APPLICATIONS the element of energy cost is unimportant in the context of the special advantages that electric heat sources provide. In many cases there are no practical or safe alternatives. Whether the application is for safety, for process or for human comfort, the areas of opportunity for practical and economic use of electric heat are growing at an unprecedented rate.

THREE DISTINCT FACTORS are encouraging the trend. The ease of control is a natural for the current swing toward industrial automation. Plant designers are boldly eliminating structural enclosures around equipment, particularly in the utility and chemical industry. The cost of custodial man-power for the operation and maintenance of conventional combustion sources and systems has been rising steeply. Any one of these developments is sufficient cause to re-examine our traditional criteria on heat sources, uses and costs.

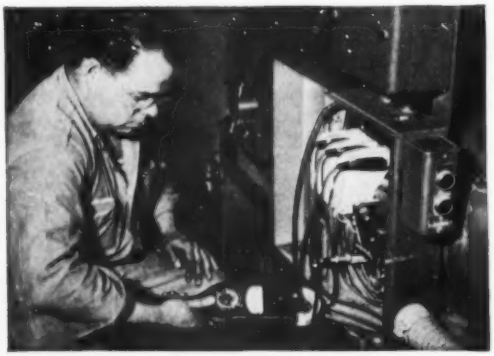
AS A MARKET OPPORTUNITY for the electrical industry, electric heating is far more important than the sale of heating equipment would indicate. Even inexpensive utilization devices can involve substantial control, wiring and equipment installations. The electrical contractor can profitably build business for the long range by an alert competence and ingenuity in electric heating application today.

Wm. T. Stuart



RADIAL LOAD CENTERS, TRANSFORMERS, CAPACITORS, AND BUS DUCT SYSTEMS contribute heavily toward lowered production costs for your industrial clients — a fact that grows in its importance to them each day. To help you plan efficient power distribution systems for them, feel free to call on the services of a Graybar Representative at any time.

How modern power distribution systems cut costs



ELECTRICAL CAPACITY DOUBLED without new transformers or wiring when a G-E capacitor was installed here — savings in power costs paid for installation in 3 years. G-E capacitors and other popular G-E power distribution equipment is distributed nationally by Graybar.

Here are figures your customers will find hard to ignore in their drive toward lower production costs:

- **up to 34% more capacity from existing systems**
- **up to 18.5% less shutdown time**
- **up to 50% savings on power costs**
- **up to 150% annual return on your investment**

Powerful statements, to be sure, but still *facts* that can be backed up with actual case-history proof by your local Graybar Representative.

If your customers face the problem of designing a new power distribution system – or of forestalling major rewiring through increased efficiency of an existing system – then *now* is the time to call Graybar.

You know that it's just as costly to plan for, install and service inferior, misfit equipment as it is to do the same with quality items custom-fitted to specific needs. Let Graybar Power Specialists help you *prove it to them.*

As distributor of over 100,000 different electrical items made by 200 leading manufacturers, you can always be sure of carefully-considered, impartial recommendations. It's the common-sense result of ordering power needs – as well as equipment for lighting, wiring, ventilating, and communication – *via a single source . . . a single responsibility. Graybar Electric Co., Inc. Executive Offices: Graybar Building, 420 Lexington Avenue, New York 17, N. Y.*

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IN OVER 100 PRINCIPAL CITIES

REPORT ON WINNING ENTRIES IN . . .

The National Lighting Competition for Electrical Contractors

Eighteen prize winning entries in contest sponsored by *ELECTRICAL CONSTRUCTION AND MAINTENANCE* reflect lighting progress, demonstrate electrical contractors' initiative in selling modern lighting in full cooperation with all branches of the industry.

THE National Lighting Competition for Electrical Contractors, announced in mid-January, ended August first. Entries were judged August 14, and prize winners were announced August 26. Eighteen entries won cash prize awards, and thirteen other entries were awarded honorable mention for their excellence. The cash prize awards, three each in six different lighting classifications, are published in the following 33 pages, only ten months after the contest was first announced.

This is the first lighting competition ever to be sponsored on a national basis exclusively for electrical contractors and their employees. Its sponsors consider it an outstanding success, measured by all standards. Electrical contractors from nearly all geographic regions across the country entered their best eligible lighting jobs. Electric leagues and electric utility companies helped to promote it with their local contractors, as did lamp and lighting equipment manufacturers, and electrical distributors.

This lighting competition was sponsored "to encourage, and to extend public recognition to, electrical contractors and their employees who initiate, sell and install outstanding lighting installations, and to further the dissemination of meritorious lighting information." All of these objectives have been, and are being, realized. Wherever possible the winning contestants are being presented their cash prizes and Award Certificates at local electrical industry meetings, for the widest possible public industry recognition for them locally. All eighteen prize winning entries are being published in this special Lighting Competition editorial section, thereby furthering the dissemination of meritorious lighting information. Each winning contestant will also receive reprints of his own winning entry, as published herein, for his use in promoting the sale of more outstanding lighting installations with prospective customers in his own community.

All entries in this competition, award winners and others alike, reflect lighting progress and an increasing use of modern new lighting techniques. They give an insight to the sales approach used by many electrical contractors. They demonstrate the contractors' initiative in selling quality lighting in homes, in commercial establishments of all types, and in factories, and elsewhere. They also reveal the contractors' willingness and ability to use sales aids and engineering assistance offered by other branches of the lighting industry, and to cooperate fully with electrical distributors, electric utility lighting engineers, lamp and lighting equipment manufacturers representatives, and others.

Lighting sales continue to increase annually. New building construction has provided much of the market for lighting over the past few years. Of even greater importance is the relighting market, which remains virtually untapped. In the months and years ahead, all branches of the lighting industry are going to need more business to maintain normal growth. This phenomenal relighting market can provide the needed plus business. The practical approach to this relighting market is through electrical contractors. In every community, large and small, from one end of the nation to the other, electrical contractors are already in touch with this market. These contractors can develop this market economically. They can and will, with the help and encouragement of the lighting industry, initiate, sell, and install profitable outstanding lighting installations in new and old building alike. Entries in this competition have made this abundantly clear.

First Prize

RESIDENTIAL LIGHTING

WINNER: Edgar Sattes, Owner, Forest City Electric Company, Cleveland, Ohio

PROJECT: G. L. Postlethwait, Residence, Parma, Ohio

"Idea Home" Features Deluxe Lighting

ONE of the most uniquely lighted and practically wired residences in the country is this beautiful $70,000 home in northern Ohio. Comfortable levels of illumination are provided in all rooms and over all specific-purpose work areas. Vistas visible while sitting or moving from one room to another are pleasing to the eye, while lighting treatments in all instances tastefully combine decorative with functional considerations.

Full use was made of recommendations variously received from the Residential Lighting Consultant of the local utility company, published by the Illuminating Engineering Society, and released by various manufacturers of lamps and lighting equipment. This resulted in an overall installation of unusual merit, peak planning and a high order of installational craftsmanship. All lighting and electrical work was sold and installed by Forest City Electric Co., Cleveland, Ohio.

For several weeks after its completion, this gracious residence was opened to the public as a recommended "idea home". It was prominently featured in a special 40-page section of The Cleveland Press, and its many desirable lighting and electrical features so stimulated public interest that numerous inquiries and orders were received by both the general and electrical contractors to duplicate features of this soundly planned, adequately wired, excellently lighted home in other localities in the greater Cleveland area.

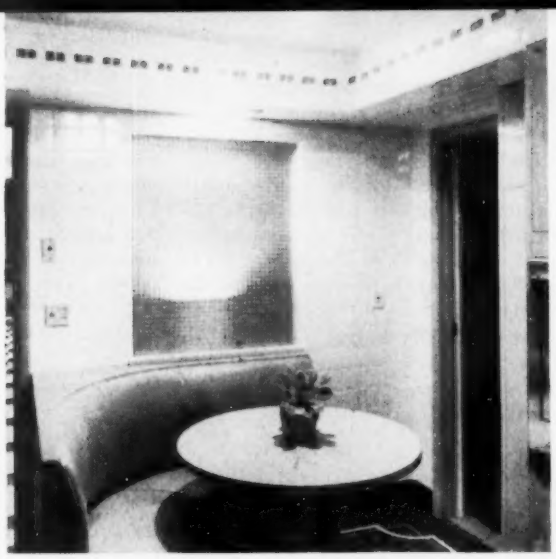
As initially viewed from the outside, the visitor is immediately impressed with the front entry. In addition to an artistic bracket fixture conventionally placed to one side of the doorway, an overhead 2-by-3-foot panel of Alsynite is evenly backlighted by a recessed 75-watt R-30 lamp in a porcelain socket, providing an abundance of illumination for safe footing and prompt recognition of visitors.

Above the exterior steps, and running above dining room and kitchen windows to the garage canopy, is another Alsynite panel measuring 9 inches by 24 feet, backlighted by four rows of 40-watt rapid-start cool white fluorescent lamps which may be switched either from the front entry or a master control switch.

FRONT ENTRANCE is ornamentally flanked by artistic bracket fixture while overhead panel of backlighted Alsynite provides ample illumination for safety. Long Alsynite panel extends beneath roof eave from porch steps to garage.

FLAGSTONE TERRACE and fountain is floodlighted by 150-watt PAR-38 reflector flood units which may either be white, or colored for decorative treatment in accordance with effect desired by home owner.

LIBRARY has two valance treatments, one above the window distributing light both upward and downward, the other above the ornamental wall map behind the TV set. Fluorescent lamps are warm white.



BREAKFAST CORNER of kitchen has three lighting possibilities: opaque glass panel backlighted by table lamp, general area illuminated by lamp recessed in dropped ceiling, or table highlighted by 150-watt flood lamp.

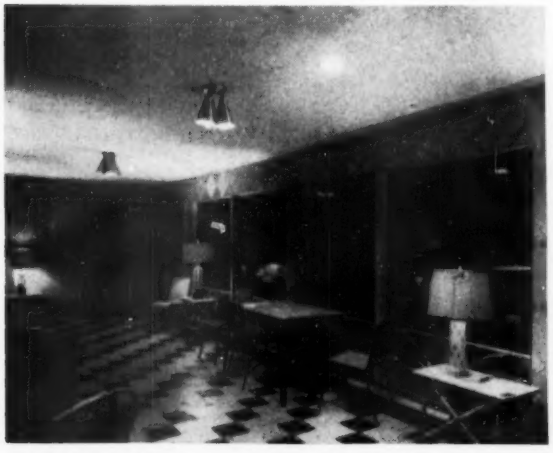
The area immediately in front of the roll-up garage door is adequately illuminated by two semi-recessed 150-watt incandescent units beneath the full-width canopy, providing additional convenience and safety for persons approaching the garage or side entrance. This wealth of exterior illumination also enhances the beauty of architectural and landscaping features to their fullest potential.

At the rear of the home a flagstone terrace prominently features an ornamental fountain (serving the additional purpose of cooling recirculated water for home air conditioning), while cross-lighting is obtained by two PAR-38 150-watt floodlamps. These reflector-floods, as well as additional units directed downward to illuminate the terrace proper, may be replaced as desired by colored lamps, thereby making it possible to change tonal effects on the water and stone work in accordance with seasonal motifs or festive desires. Since these lights may be controlled either locally or from a central panel in the master bedroom, convenience of switching is combined with protection against prowlers.

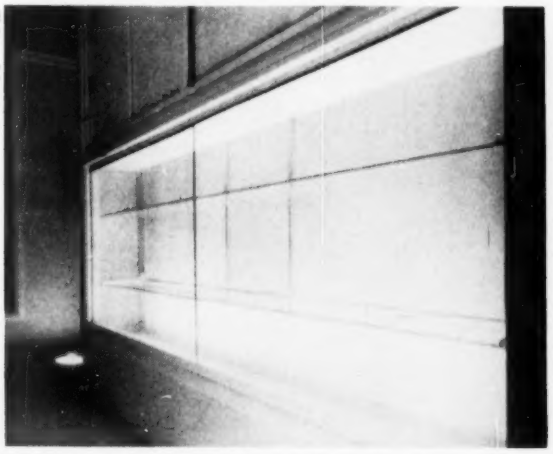
Immediately adjacent to this outdoor terrace is a vinyl-tiled patio enclosed by a floor-to-ceiling double-pane glass wall. Ceiling-recessed high-hat fixtures containing 150-watt floodlamps provide an abundance of general illumination, while numerous conveniently-placed wall plugs are provided to serve floor and table lamps.

Inside the home are other meritorious lighting features as well. For example, in the library, valance lighting above the window directs light upward to the acoustical tiled ceiling and downward across the folds of the drapes, while a cove installation above and in front of an ornamental wall map also provides soft background illumination for those who wish to view television in an environ of general low-intensity indirect lighting. In both of these installations, lamps are warm white rapid-start fluorescents; two 40-watt tubes installed over the window and two 30-watt lamps placed above the wall map.

Valance lighting is also installed above the wide picture window in the living room, and over the two corner windows in the dining room. In addi-



ENCLOSED PATIO is variously illuminated by triple-unit swiveling fixtures lamped with 100-watt bulbs, recessed high-hat assemblies containing R-40 floodlamps, and decorative table lamps plugged into convenient wall outlets.



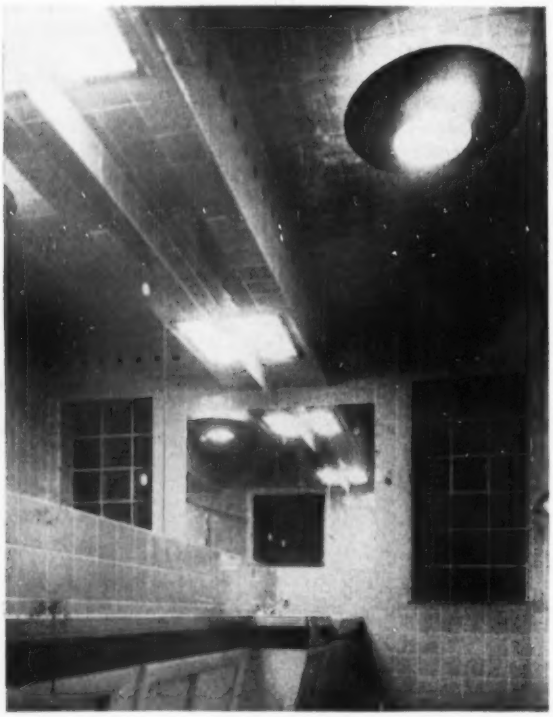
TROPHY CASE is illuminated from two rapid-start warm-white 40-watt fluorescent lamps recessed in 5-inch-deep overhead trough. Footcandles measured in the glass-shelved case range from 35 to 50.

tion, the dining room is centrally illuminated by a Lightolier "Sculptone" fixture combining the same delicate curves as observed in an ornamental wrought iron grill serving as a partial division wall between dining and living areas of the home. With textured plaster ceiling, wall-to-wall carpeting, rich draperies and furniture, plus the combination of both figured and plain paper treatments on the several walls, the dining area becomes a gracious, spacious, eye-pleasing addition to this residence.

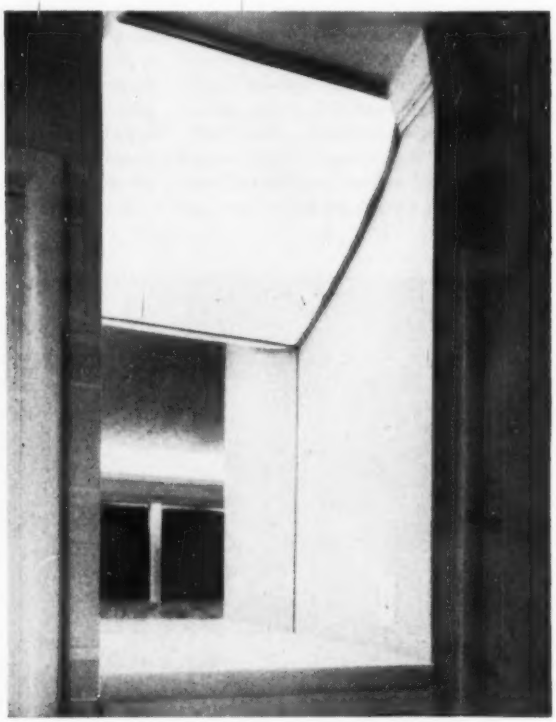
In the modern U-arranged all-electric kitchen, an outstanding lighting treatment is noted in the breakfast corner, where three separate effects may be obtained through the use of a 75-watt incandescent soffit light, a 150-watt R-40 ceiling-recessed circular unit above the round table, and an opaque glass panel in the kitchen wall which may be backlighted by a table lamp located in the enclosed patio. These three lighting possibilities provide low-level decorative effects, medium-level illumination for casual dining, or high-intensity lighting for critical-seeing tasks.

DINING ROOM combines fluorescent valance treatment above corner window arrangement with ornamental portable credenza lamp and special Lightolier center-ceiling fixture that blends with the wrought iron grillwork.

ONE BEDROOM has valance extending completely across one wall, with arms extending above corner windows. Numerous wall outlets are conveniently located for table lamps, clock, radio and small appliances.



BATHROOM has central ceiling Electroglass Thermolite unit, combining general illumination source with 500-watt heat lamp. Mirror above washbowl and vanity shelf is lighted by two semi-recessed incandescent fixtures.



NICHE in master bedroom is located between two closets, contains a liberally-sized mirror above a chest of drawers and is illuminated by inclined Glastron panel backlighted by two 100-watt incandescent lamps.

BASIC FLOOR PLAN (used in reverse) shows position of lighting units, switches and outlets. Connected lighting load exceeds 11-kw. Residence was wired by electrical contractor Edgar Sattes of Cleveland, Ohio, for builder George L. Postlethwait. Many of the outstanding lighting ideas were received from consultants of the Cleveland Electric illuminating Company, and made use of standard lighting units of 14 different equipment manufacturers.

Moving into the sleeping wing of the home, one is impressed with continuous valances that run from wall to wall; the wealth of wall receptacles for the service of table lamps, radio and clock, small appliances and the like; and a unique niche located between two closets fitted with a chest of drawers for the master of the house, a large wall mirror, and an overhead inclined Glastron fibre-glass panel backlighted by two 100-watt incandescent lamps.

Bathrooms are likewise liberally lighted with two incandescent fixtures semi-recessed over the all-glass walls above wash basins and vanity tables to provide large-area low-brightness illumination, 500-watt Electroglass "Thermolite" heating-lighting pendant-mounted fixtures in the tiled ceilings, and 40-watt vaporproof units in the shower stalls. All lighting and heating units are separately switched for maximum utility and convenience.

One additional feature in this idea-packed home should also be mentioned in this lighting summary. That is the illumination for the trophy cabinet which is located in the hallway directly opposite the study door. Two 40-watt warm-white rapid start fluorescent lamps are trough-recessed above the glass shelves, directing a flood of illumination downward to prized possessions displayed in front of a dull blue rear wall.

As noted, special cold weather fluorescent lamps are used in all recessed outdoor installations; valance lighting features rapid-start tubes with converted ballasts for instant illumination in all interior rooms; general low-intensity background lighting is increased by both spot and flood units for special effects, activities or work-areas; recessed units are used to emphasize architectural features and provide visual contrast, while incandescent lamps were used in baths, kitchen and dining room to provide pleasing color environs for viewing faces and foods. Mercury switches are used throughout the home for silent operation; all exterior lighting may be controlled either locally or from a panel in the master bedroom, and garage doors are controlled by radar. The total connected lighting load exceeds 11-kw.

As to footcandle levels; exterior areas average 5-fc while interior *general* illumination ranges from 5 to 10 footcandles. Readings taken in specific work, display and reading areas indicate that there are 20 footcandles at face level in front of vanity mirrors, 20 for reading in bed, 25 for dining in either the dining room or kitchen, 25 to 50 for reading in various easy chairs, and 35 to 50 footcandles in the trophy case and on the several work areas. Reflectance values of ceilings vary from 87% to 74% while wall reflectances average between 30% (in the library) and 69% (in the dressing niche of the master bedroom).

This "idea home" is truly packed with lighting ideas, both inside and out. Furthermore, these lighting techniques are inexpensive, easy to install, and use standard lighting units, fittings and equipment, readily available to all prospective new home owners.

Lighting fixtures were manufactured by Atlas, Electro, Electroglass, Hips, Jay, Jet Lite, Lightolier, Litecraft, Marco, Mitchell, Paulding, Progress, Pryne and Steber. All lamps are General Electric. Lighting equipment was purchased through normal wholesale channels; H. Leff Electric Company and Midland Electric. Valuable suggestions concerning lighting plans, the location of outlets and the use of modern residential electrical aids were contributed by Charlene B. Reed and Thomas Hanrahan of the Cleveland Electric Illuminating Company.

First Prize | **FLOODLIGHTING**

WINNER: M. R. Minto, MacNutt Electric Co., Inc., New York, N. Y.

PROJECT: Franklin Savings Bank, New York, N. Y.

Flare Lighting Accents Building Design

NEW modern light sources and new materials made it possible to effectively light the exterior of the Franklin Savings Bank, located on a prominent corner in the Times Square area of New York City, in a most distinguished manner. Since the early fall of 1952, when the installation of a new exterior lighting system was completed, this old French Renaissance building is even more beautiful by night than by day. Astronomical time clocks automatically turn the lights on and off, so that as nightime approaches, on come the lights to accent the building design as if from flares or torches as in the days of old, and to advertise and identify this bank to the thousands of potential customers who pass it nightly.

The new lighting system is based essentially on the use of new type light sources in simple lampholders, carefully located to project light on those details which make the building distinguished. The system is made even more effective through the use of special curtains, made of a new material which made their use possible and practical. These hang behind the five large high glass windows. In fact, the curtains were designed to serve as reflectors and refractors of light to dispel the "dead" look which the uncurtained windows previously presented. Now these bright curtained areas add a brilliant sparkle, and further enhance the beauty of the building in a brightly lighted neighborhood.

The need for exterior lighting on this bank building had long been recognized. M. R. Minto, of MacNutt Electric Co., Inc., electrical contractors who initiated, sold and installed the new lighting system, said that job initiation extended over a period of more than five years, and involved many hours of estimating, engineering and personal contact. The usual methods of floodlighting were ruled out because of the architectural character of the building, and because of their impracticability. Then the completion of the new Port of New York Authority Bus Terminal, located one block below the Franklin Savings Bank, attracted a flow of traffic of over 125,000 people daily who represented increased potential customers from out-of-town. This change in the character of the people using the neighborhood made the exterior lighting even more important.

In discussion with bank officials, MacNutt Electric described the development of new light sources, new lighting techniques, and new tools of lighting, which made the project feasible. Because of the importance of the architectural factors, as well as the ultimate lighting effect, they recommended they be authorized to secure the services of Richard Kelly, professional lighting design-engineer, to design the project. The bank officials agreed.

Structural Conditions

The bank building has five windows each measuring 15 feet wide and 30 feet from sill to top of arch. Each window has a narrow ledge on the exterior, and a narrow sill on the inside. The building is typically Renaissance, with large columns flanking the entry, ornate column capitals, cornices, and friezes. There were no adjoining buildings from which the light could be projected. The architectural design of the ceilings and lack of columns made it impossible to mount the luminaires any significant distance from the details to be lighted.

The building is of stone construction on the exterior, so no recessing of light sources could be considered. All exterior units had to be exposed to the weather. The interior features include marble up to the level of the window sill, and solid walls which could not be used to conceal the wiring.

A superstructure has been added above the cornice level (see photograph) which does not fit in well with the main structure. The lighting had to be so designed that this portion of the building would practically disappear.

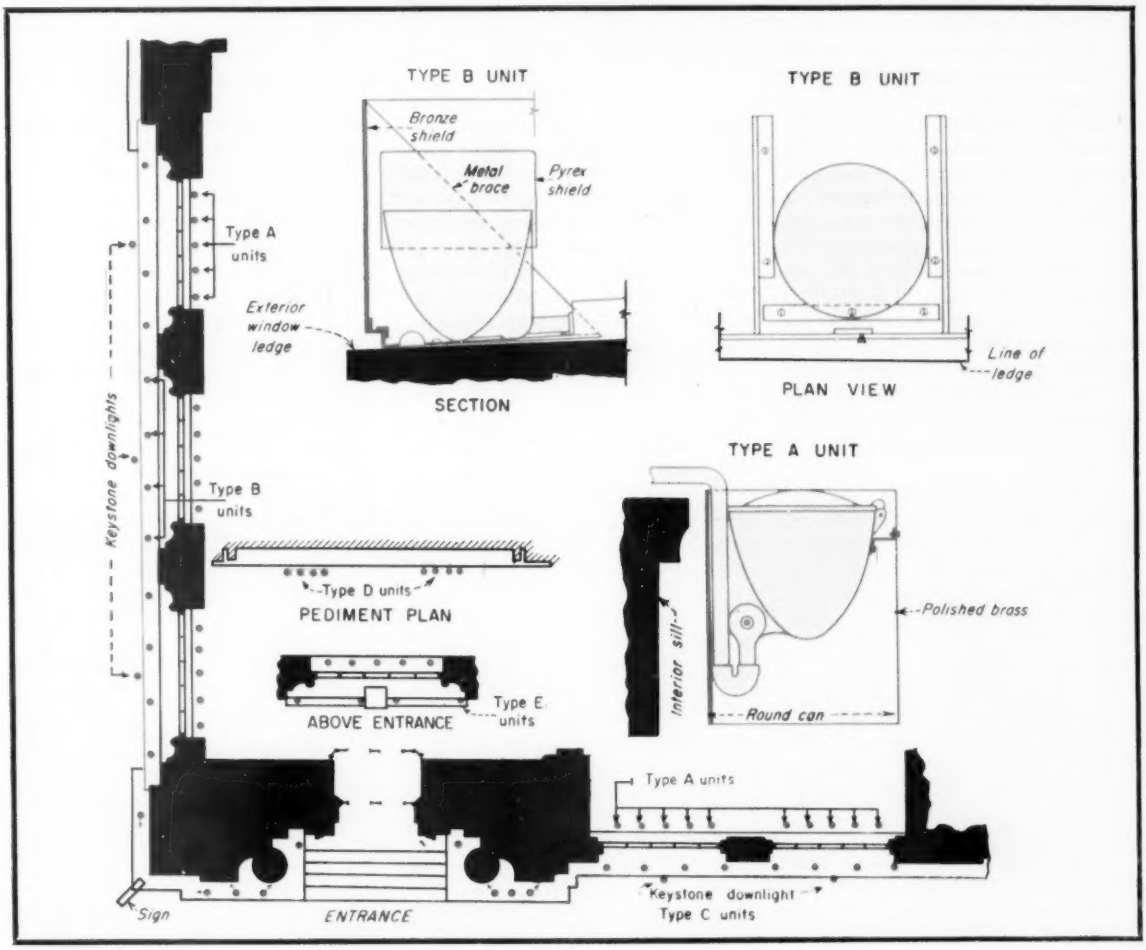
Lighting Solution

The lighting solution involves a technique which its designer, Richard Kelly, calls "flare lighting". It utilizes light sources to highlight the details which make the building distinguished. This technique is a modern counterpart of the Renaissance use of flares or torches which were often affixed at the top of the base course of monumental edifices of that period.

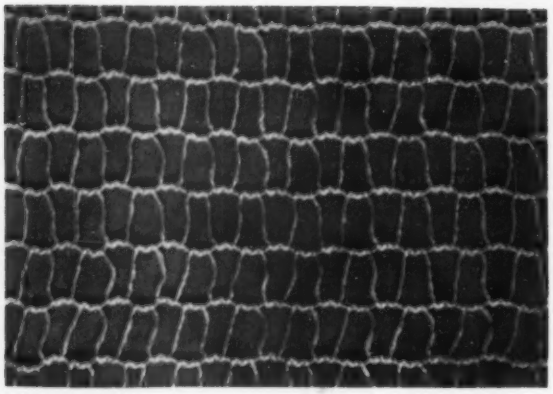
As shown in the lighting plan, exterior lighting units were mounted on the window ledge and concealed behind a continuous bronze shield along the

FLARE LIGHTING accents the exterior architectural beauty of the French Renaissance design building of the Franklin Savings Bank, New York City. Installation is based on new lighting techniques.

ORNATE CORNER BUILDING posed an exterior lighting problem for MacNutt Electric Co., Inc., New York City, for more than five years, was finally solved with new light sources and techniques in cooperation with Richard Kelly, lighting design-engineer.



LIGHTING PLAN showing location of lighting units to provide unusual lighting effect. Types A and B lighting unit details are also shown. Type A units light Dynel curtains from the interior to relieve "dead" effect of window glass.



DYNEL FABRIC was used to provide light weight curtains to pick up and diffuse light behind glass window areas.

BRONZE CANS on window ledge shield PAR-56 reflector spot lamps in adjustable lampholders to light columns.

outer edge of the window ledge. Four 300 watt PAR-56 reflector spot lamps were used to light each window. These were installed in Magni-Lite Type L back prong lamp holders below a pyrex glass shield (Type B units in Lighting Plan). These units are focused on the arch of the window, and also light the cornice. The columns at the entry are lighted from fixtures at the bases, focused to bring out the rustication of the stone, and highlight the capitals. These are similar type Magni-Lite lampholders, which are concealed in bronze cans with room for adjustment. The entry arch is lighted from similar units installed behind the columns, and a bust of Benjamin Franklin over the doorway is lighted by spotlights concealed in a sign on either side of the figure.

The revolving clock installed on the corner of the building, first in the world of its type, is floodlighted by two 150 watt PAR-38 reflector spot lamps installed on the window ledge, one on the side of the building and one on the front.

At each window arch, a louvered downlight throws a circular pool of light on the sidewalk which increases the general light for the heavy pedestrian traffic, and creates an interesting effect.

It was recognized that, even with the exterior highlighting, the building would appear dull and lifeless without some treatment of the large expanse of clear window glass which at night appeared black. For this reason, special material curtains were installed, which serve as a reflecting surface for sealed beam units (Type A units in Lighting Plan) placed just below the window sill on the inside of the building. These units were built into polished brass cans, which are installed in an upright position but permit some swivelling for focusing.

All light sources are of the incandescent type, General Electric PAR-56, PAR-46 and PAR-38 reflector spot lamps. The PAR-56 lamp was selected because of its high efficiency for this application, producing 100,000 beam candles at 300 watts power consumption. Its narrow beam distribution makes it possible to project thin sheets of light to delineate the important architectural details.

Special Curtains

One of the interesting aspects of this installation is the use, for the first time, of a completely new material, with unusual characteristics, for the curtains.

The material is Dynel which, at the time, had only been produced for use in tire fabrication. But experiments had been made in the textile field, and a limited amount of the fibre was available. Through Marie Nichols, New York City dealer in curtain fabrics, sufficient fibre was obtained from its producer, Union Carbide and Carbon, to make up curtain material for the project. After the fibre had been specially made into yarn, it was woven into a section four feet wide by 240 yards long, from which a local drapery manufacturer made up and installed the curtains.

Dynel is so light that a panel 8 feet wide by 36 feet high is easily supported on a curved aluminum strut hinged to open as a gate to permit access to the windows for washing. Since it is astatic, airborne dust does not easily collect on it. The small amount picked up by the fibre adds to the sparkle when lighted by the spotlights. It is fireproof, shrinkproof, and fadeproof. In spite of its large mesh (about ¾- by ½-inch) it picks up light and diffuses it effectively, thus eliminating the "dead" effect of uncurtained windows.

Stuart Adams Lyman, President of the Franklin Savings Bank, commented on this new lighting system when it was first turned on, as follows:

"For 92 years the Franklin Savings Bank, which has served more than 800,000 depositors, has not at night been in keeping with its environment which is the center of the area known as the Great White Way—Times Square.

"We realized some time ago that we could not drastically change our building without demolishing it and starting over from scratch—so we have made the best of what we had. We installed lighted show windows in the granite exterior, we erected the first revolving clock in the world, we have evening hours for the convenience of our depositors, and now we have made one of the finest installations of lighting in the country.

"In order to highlight the significant details of the character of our building and to compete with the strong modern lighting of other structures in our neighborhood, a new technique was developed which is best called *flare lighting* and is quite the opposite in effect to that of *floodlighting*.

"We feel that the passerby, the storekeepers, and the theatre and restaurant owners of our neighborhood will appreciate having this corner lighted and that it will help improve the general appearance of the entire section as well as provide better evening protection to the general public."

M. R. Minto commented on this job as follows:

"This entire project is one of the most significant we have done. We were responsible for every detail, from the hiring of the lighting designer to the final completion of the project. This included curtains, bronze work, painting, the making of a bronze sign, scaffolding, and the many other large and small parts which made up the completed installation."

First Prize | **OFFICE LIGHTING**

PROJECT: M. R. Minto, MacNutt Electric Co., Inc., New York, N. Y.

WINNER: New York, N. Y. Western Electric Co., Inc.,

Ceiling Conditions Sound and Light

WESTERN Electric Company's offices for their Distributing House Planning Engineer in New York were modernized early this year. Located on the third floor of a 60-year-old downtown office building, these premises occupy an area of 5,860 square feet, and include two private offices and a large general office area of irregular shape. Modernization consisted of repainting, plus the addition of an Acusti-Luminous ceiling to provide modern acoustical treatment and comfortable high level light conditioning. An illumination intensity of approximately 60 footcandles is provided throughout the entire office area.

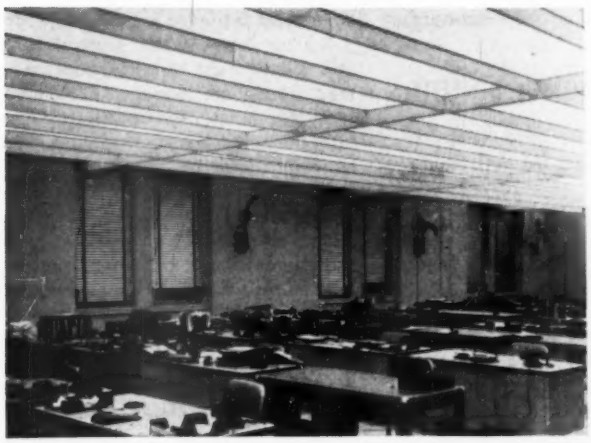
The responsibilities of the Planning Engineer include the planning of physical facilities for offices, warehouses and shops for Western Electric Company throughout the United States, with emphasis on modernization. Thus, the lighting design in this office area is appropriately enough partly a demonstration of what can be achieved, primarily through lighting, in bringing space in an old building up to modern standards, at a moderate cost in a minimum of time.

This office area was previously lighted with incandescent lamps in enclosing glass globes, with a very low maintained level of illumination and uncomfortable brightness contrast. It was especially inadequate and unappropriate for the visual tasks involved in the activities of the office, including purchasing, clerical activities, typing, and other office operations.

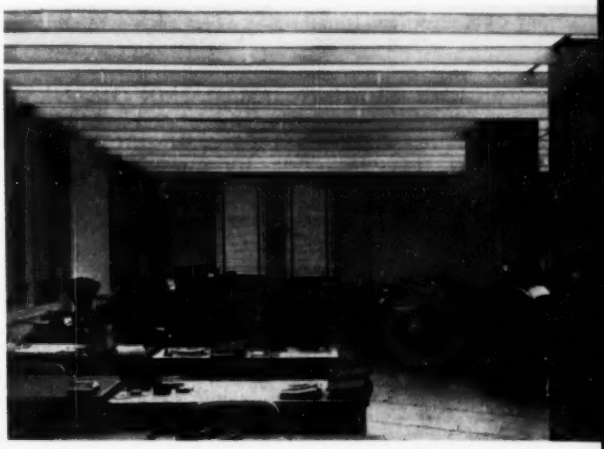
In planning the relighting, various structural characteristics had to be considered. High ceilings existed throughout the area. Windows were deeply recessed, and extended almost to the level of the ceiling. Beam construction was complex, and the space was not square. All wiring would have to be run exposed. Exposed conduits, sprinkler pipes, and other utility lines covered the ceiling. In addition, the space was urgently required, and the entire installation had to be completed in one month.

The presence of sprinklers influenced the choice of ceiling and lighting treatment. A conventional hung acoustical ceiling would have required expensive plumbing to bring additional sub-sprinkler heads down below the new ceiling.

MacNutt Electric Company has devoted "missionary" sales efforts over a period of years to the luminous ceiling type of lighting, and has made a demonstration installation in their own



LUMINOUS CEILING with acoustical baffles provide light and sound conditioning in offices of the Western Electric Co., Inc., New York City, and provide a major modernization feature.



LOW BRIGHTNESS BAFFLES absorb sound and shield luminous plastic panels in normal line of view in this general office area.

OBSTRUCTIONS on ceiling, such as sprinkler pipes, beams, etc. were concealed by installing new luminous ceiling two feet below light strip wiring channels.

PRIVATE OFFICE is comfortably lighted with two-level intensity by wall-to-wall luminous ceiling incorporating acoustical baffles. Note how ceiling was modified for corner offset.

offices to give potential users an opportunity to see and appreciate first hand the comfortable environment created by a luminous ceiling. When the Western Electric project became known, they again promoted a luminous ceiling installation with A. E. Geiger, the Planning Engineer. After consideration was given to many other types of lighting, the luminous ceiling type was adopted, using the corrugated vinyl plastic diffusing panels which permit the sprinkler heads to remain in their old location in the plenum, and still provide the fire safety required.

The design objective for the new lighting was that the lighting system would be the principal component in modernizing the area, also that it would provide an illumination level of not less than 50 footcandles, and be glarefree and comfortable.

These design objectives were fully met through the use of the luminous ceiling, which also incorporated sound-absorbing baffles. This system was selected because it was reasonably priced, achieved a louvered ceiling without any structural changes, and concealed the conglomeration of exposed piping, etc. on the existing ceiling. It also provided various customer benefits such as lighting flexibility, low brightness in all directions, and easy maintenance. Another factor influencing the decision to use this lighting system was the fact that it would enable the project to be completed in the shortest period of time, largely because it did not involve any major structural changes.

The luminous ceiling installation consisted of fluorescent slimline lamps on wiring strip, surface mounted on the existing ceiling, with light-diffusing corrugated plastic panels suspended two feet below the lamps on continuous "I" track. Perforated acoustical baffles were suspended on the underside of the "I" track for acoustical correction and to achieve a louvering of the luminous panels to further reduce ceiling brightness. Switching was done at the panel, with the circuits arranged for two-intensity flexibility, so that one-half or full lighting intensity could be provided in any area as desired or required.

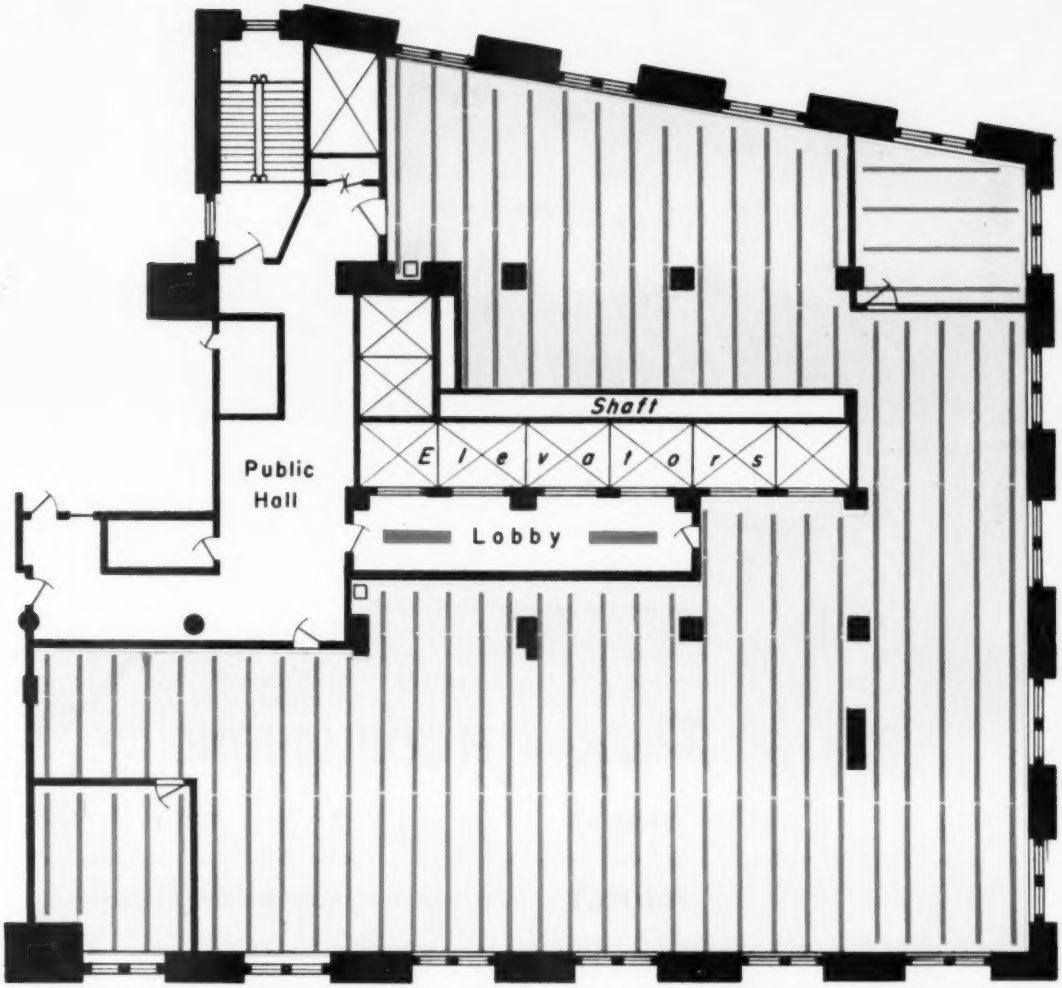
Functionally, the use of luminous ceiling lighting achieved high levels of low brightness illumination. Esthetically, the simplicity of the luminous ceiling, balanced by the modular layout of the sound baffles, creates an atmosphere of orderliness. It also permits the use of a greater variety of colors and furniture groupings.

Standard cool white General Electric slimline fluorescent lamps were used throughout, operated at 430 ma. from two-lamp General Electric ballasts. Features of instant starting, ease of maintenance, and lower cost of installation per unit length were influencing factors. Bare lamp light strips were used and the entire plenum space above the suspended luminous ceiling was painted white, with a reflection factor of 85%. Walls were finished in pastel colors, having a 50% reflectance. Floors have a 35% reflection factor, and the furniture light gray with a 30% reflectance.

Brightness of the corrugated plastic ceiling is approximately 100 footlamberts. Due to the shielding effect of the acoustical baffles, however, this

NEW LIGHTING SYSTEM PROVIDES THESE CUSTOMER BENEFITS

1. ***Flexibility to meet changing office needs.*** Because the space is uniformly lighted from wall-to-wall, office changes do not require lighting alterations.
2. ***Low brightness in all directions.*** Because of the "U" shape of the space, desks and personnel cannot be faced in any one direction. With acoustical baffles run in two directions, ceiling brightness is shielded from all angles.
3. ***Economical cost of installation.*** Because the customer could not get a long term lease, this was a major consideration. Use of a luminous ceiling avoided necessity for major construction changes.
4. ***Ease of maintenance.*** The entire lighting system can be "laundered" at low cost over a single weekend. This is important, as the building is in an area containing a great deal of airborne dirt, and the area is not air-conditioned.



SLIMLINE LIGHT STRIPS are spaced 42 inches on centers above luminous plastic panels throughout entire office area. Plastic panels are 36 inches wide and run normal to light strips. Sound baffles are installed between panels.

brightness at normal viewing angles is reduced to the brightness of the baffles, which is approximately the same, as the seeing tasks on the desks below, or 35 to 50 footlamberts average.

This lighting installation was promoted and sold by MacNutt Electric Company, Inc. However, after the initial interest and desire had been created, and desired lighting levels had been established with the customer, the local representative of Luminous Ceilings, Inc., David B. Bluford, was called in for engineering assistance. The customer was then invited to visit the demonstration installation of luminous ceilings in the contractor's office, after which the job was engineered, estimated, quoted on and sold.

This is only one of many cases where MacNutt Electric has used the lighting system in their own offices to promote luminous ceiling lighting.

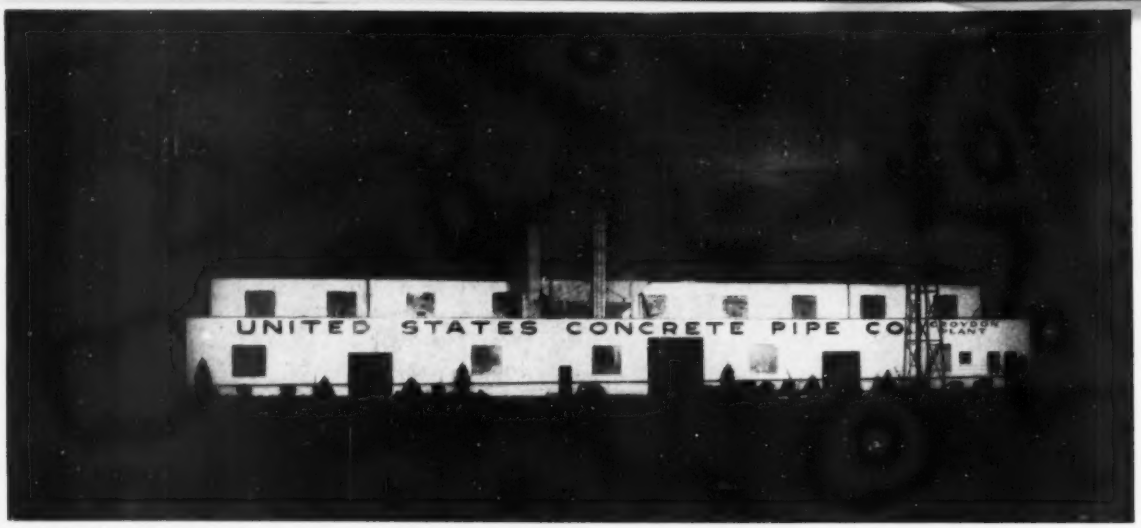
BRIGHTNESS VALUES IN OFFICES

Area	Footlamberts
Corrugated Plastic Ceiling	100
Baffles, Normal to Sides	40
Upper Side Walls	30
Lower Side Walls	25
Visual Tasks	35-50
Furniture — desk tops	20
desk sides	7
Floors	18

M. R. Minto, secretary-treasurer of MacNutt Electric Company, Inc., has this to say about this lighting job: "This particular installation has created more interest and comment than any other office lighting we have ever done. The employees who work in the space are delighted with it, and it seems to contribute to neatness and efficiency. Despite the fact that no special furnishings have been employed, nor any special furniture installed, there is an appearance of everything fitting together in a pleasing composition, as in a picture. This is true of the general offices as well as of the two private offices.

"In spite of the very high levels of lighting, the degree of seeing comfort can be sensed from the feeling of there not being much light as one walks into the area. Typists, billing clerks, and teletypewriter operators have commented on the lack of shadows, and the ease with which they can see their work.

"As the photographs show, a 20th Century look has been given to a 19th Century space."



FLOODLIGHTED BUILDING and sign of the United States Concrete Pipe Company stand out dramatically after sunset. Result is obtained by nine 1000-watt floodlight units mounted on specially-designed steel towers located 131 feet from the face of the structure which parallels Pennsylvania Railroad mainline and a highway.

THE LIGHTING COMPETITION

Second Prize

FLOODLIGHTING

WINNER: George P. Bailey, Pres., George P. Bailey & Sons, Bristol, Pa.

PROJECT: United States Concrete Pipe Company, Croydon, Pa.

Floodlights Identify and Protect Plant

INITIATIVE, salesmanship, practical designing and installational craftsmanship are attributes of electrical contractor George Bailey of Bristol, Pennsylvania, who recognized a dramatic lighting opportunity, promoted its potential benefits to an industrial organization, prepared plans for its attainment and carried the installation through to satisfactory completion. These progressive actions resulted in effectively floodlighting the plant, sign, grounds, and stockpiled products of the United States Concrete Pipe Company of Croydon, and prompted numerous inquiries which directly resulted in additional electrical work for Bailey.

The benefits to be obtained from this job were first realized by the contractor while he was employed at the plant installing new feeder lines to serve a growing power load. Since the plant was closely adjacent to a main highway and a railroad right-of-way, it was apparent to him that the exterior of the building could be used advantageously as a giant signboard, prominently displaying the company's title to passing motorists and train passengers. This not only would identify the plant, but would draw attention of the public to the large assortment of concrete pipe sections and products which were stored outdoors in front of the building. Still another advantage would be that of protection against prowlers and pilferage. These desirable features were discussed with the management, and a request for detailed plans was promptly received.

In analyzing the problem, Mr. Bailey reasoned that the lighting towers should be placed at the fenced property line, 131 feet distant from the building, in order to keep storage and loading areas unobstructed, obtain uniform illumination over the entire structure and minimize the number of lighting units required. It was also reasoned that, since the second floor of the plant was stepped back 20 feet from the face of the ground floor section, floodlighting sources should be placed fairly high in order to eliminate the shadow which otherwise would be projected on the upper wall. The question of unequal illumination on these two wall surfaces, due to variations of distances from the lights, was considered, but it was decided that these gradations of intensity would be advantageous since they would promote the conceptions of form,

CLOSED-TYPE FLOODLIGHTS in groups of three are mounted as indicated on tall towers erected at the property-enclosing fence line. Control of units is by time clock, manually adjusted to compensate for seasonal variations.

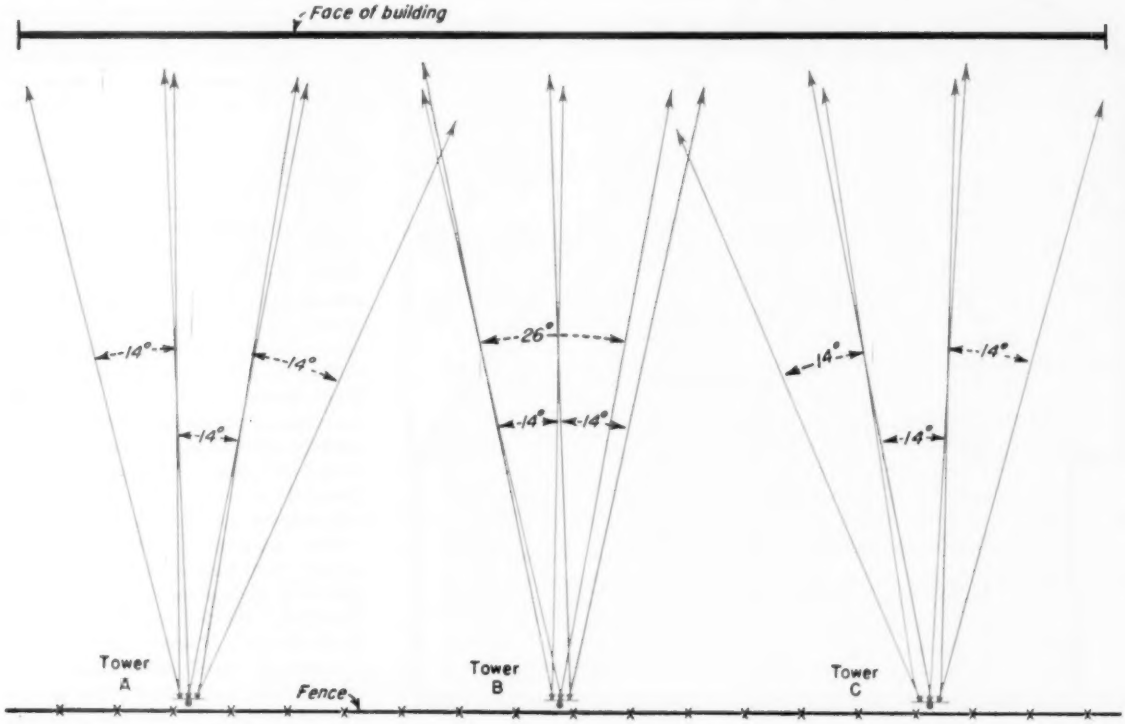
depth, perspective and statuary arrangement of the structure proper, the towers of the mixers, the hopper and glass-block panels. Since the towers had a lower reflectance value than the white walls of the plant, they were slightly emphasized by concentrating most of the light from the central lighting tower on that important area. This was accomplished by combining a 26-degree floodlight beam with two 14-degree patterns, with the wider beam approximately duplicating the combined fields of the two narrower beams.

With the cooperative assistance of the Philadelphia Electric Company's Lighting Application Section, Mr. Bailey determined that eight 14-degree beams, with adjacent beam patterns slightly overlapping each other, would be required to evenly illuminate the face of the 200-foot-long building front. Then, as previously indicated, a ninth unit having a 26-degree beam was added to build up the illumination of the central section. The lighting units selected were 1000-watt closed-type Westinghouse floods, No. 1220536, equipped with mounting brackets for tower cross-arms, and both horizontal and vertical adjustments graduated in degrees to facilitate accurate focusing.

Mounting arrangement of floodlight units is pyramidal, the height of the top unit being 27 feet above the ground, and that of the two lower units being 24 feet. Distance from mounting platforms to lamp centers is 18 inches.

Incandescent lamps were selected in preference to mercury-vapor to minimize initial cost and to obtain more accurate beam control. These units (consisting a total connected load of 9-kw) are operated at 115 volts. The average footcandle intensity on the face of the building is 0.5 fc. Lighting units are controlled by time clock; the actual hours of operation being manually adjusted for seasonal variations in sunset times.

This installation—initiated, designed and installed by the electrical contractor—has given complete satisfaction as an advertising and safety means, and added business resulting from subsequent inquiries has proved the adage that a job well done is a contractor's best advertisement.



LIGHTING PLAN indicates relative position of the three towers and shows the overlapping arrangement of the eight 14-degree beams. Center tower also supports a ninth floodlight unit having a 26-degree beam that approximately duplicates the combined spreads of the two central narrower-beam units.

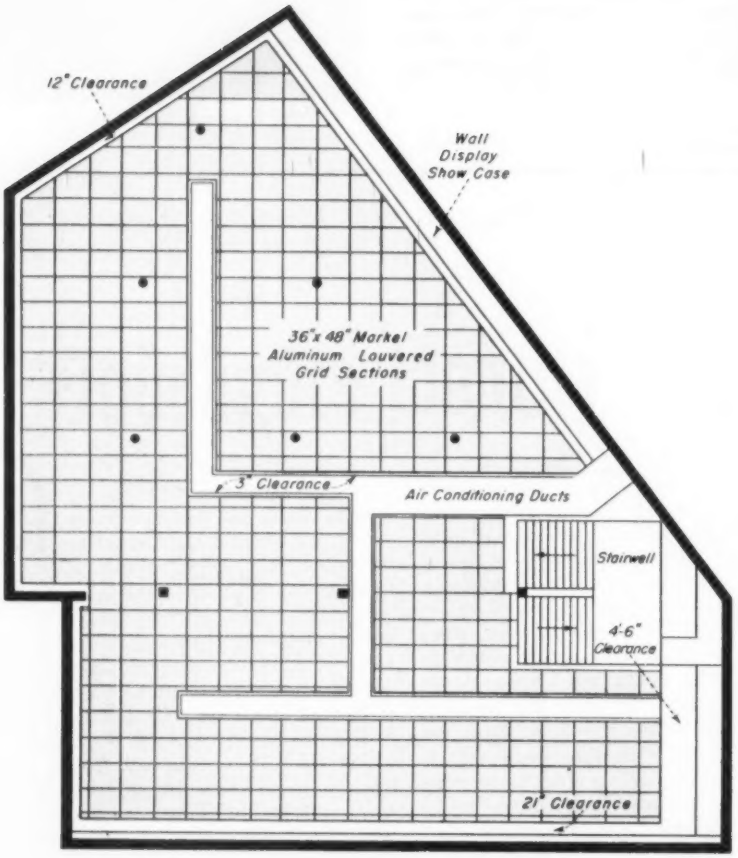
First Prize

STORE LIGHTING

WINNER: Edward B. Barber, Independent Wiring Co., Philadelphia, Pa.

PROJECT: Speare Brothers, Chester, Pa.

Apparel Sales Increase Under Luminous Ceilings



FIRST FLOOR PLAN shows louvered ceiling layout and irregularity of building with odd-shaped grid sections at walls and air conditioning ducts.

LUMINOUS ceilings proved a match for unsightly beams, pipes, ducts and other necessary evils of building construction that clutter ceilings and plague lighting engineers in the relighting of two floors for the wearing apparel departments of Speare Brothers, Chester, Pennsylvania department store. This modern lighting system and a complete rewiring job was sold and installed by the Independent Wiring Company, of Philadelphia.

The 5,466 square feet of aluminum louvered grid ceiling installed on the first floor maintains an average level of 72 footcandles at counter height, and fulfills the requirement for good illumination of vertical surfaces presented by the numerous wall cases displaying and storing merchandise. The louvered ceiling, as well as the 462 single-lamp S-140 fluorescent channels using 40-watt, 48-inch, T-12 standard cool white General Electric lamps, was manufactured by Leader Electric Company, Chicago. Circuits and ballasts are of the pre-heat two-lamp type.

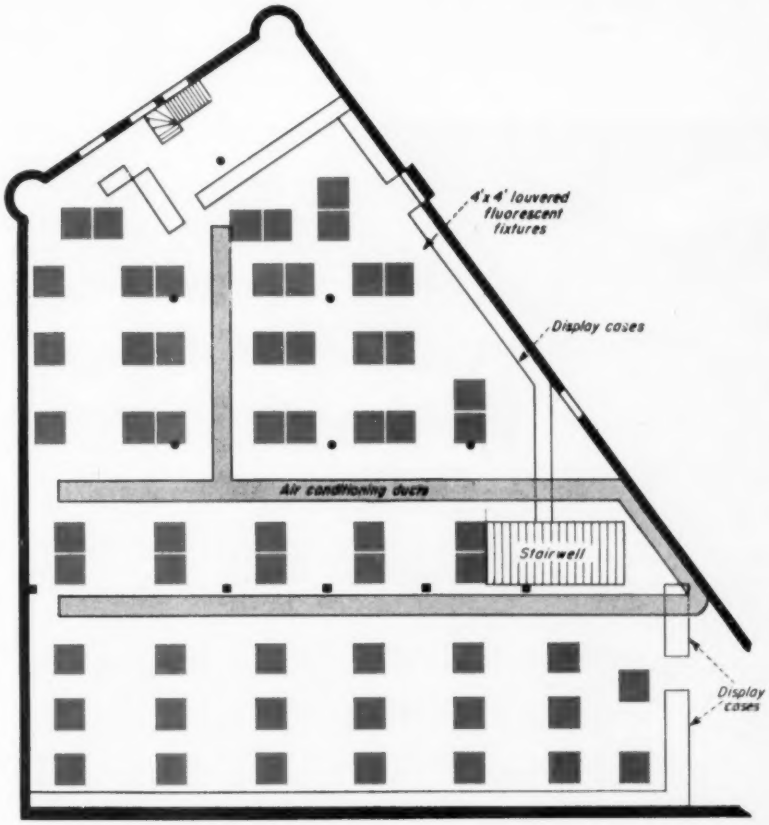
The single-lamp channels were placed on 30-inch centers at an average of 27 inches above the ceiling in the highly-reflective flat white plenum. Approximately 10 inches of the heating and air conditioning ducts protrude below the louvered grids, relieving the expanse of the old cluttered ceiling and adding to the architectural design a functional feature that had previously detracted.

LOUVERED CEILING of first floor maintains an average level of 72 footcandles at counter height, conceals unattractive high ceiling, ducts and beams, and creates cheerful, friendly atmosphere conducive to shopping pleasure.

Fitting the louvered grids around the air conditioning ducts and along the walls of the irregularly-shaped building required skillful cutting of the standard 36- by 48-inch aluminum sections into odd shapes. Travelling ladders affording access to high shelves along two walls extended above the hanging height of the ceiling, hence the ceiling was of necessity terminated sufficiently far from the shelves to allow for ladder travel. At one end of the first floor, where glass wall display cases extend to the ceiling, the grids were terminated 4 feet 6 inches from the cases and special inclined baffles were arranged at that end of the plenum to prevent reflections in the wall case glass. Clearance to other walls is 12 inches, while 3 inches has been allowed between all conditioning ducts and ceiling.

On the second floor a large area louvered grid fixture was selected to be in keeping with the treatment of the first floor. No suspended ceiling was used to cover the beams and duct suspension; however, the large fixtures draw attention away from the irregular ceiling pattern, diminish the prominence of the duct work and give approximately the same illumination as exists on the first floor. Fixtures used were Leader 4- by 4-foot ceiling type units, each containing eight 40-watt T-12 standard cool white General Electric lamps.

To eliminate possible sources of trouble arising from the use of an



SECOND FLOOR PLAN utilizes large area louvered grid fixtures, each containing eight 40-watt lamps. These units were surface mounted on the old ceiling.

OLD LIGHTING before modernization consisted of unevenly-spaced 14-inch enclosing globes on chain suspension. Much of stock was inadequately lighted, and glare was evident throughout.

LOUVERED FIXTURES four feet square on second floor provide efficient lighting, draw attention from the irregular ceiling pattern, and diminish the prominence of the beams and air conditioning ducts, shown in ceiling foreground.

inadequate and old wiring system with circuits that could not be satisfactorily traced, an entirely new wiring system was installed, including new service entrance transformers and panels. The economy of the installation may be appreciated from a consideration of the fact that the level of illumination at counter height was raised from a totally inadequate value to that of 72 footcandles with an average increase of measured demand of only 11.6 kw per month. Power requirements for the previous year ranged from 72 kw minimum to 141 maximum, while the values for the first few months after installation varied from 91 kw minimum to 147 kw maximum.

This excellent lighting installation and its resultant increase in apparel sales, a prime requisite of a job of this nature, owes its existence to the Fall Lighting Campaign of the Electrical Association of Philadelphia, an annual combined lighting industry cooperative program. The Association's direct mail promotion activity has been augmented by personal follow-up by representatives of various industry groups. After servicing this customer regularly for several years, Clinton H. Sawyer of the Industrial Retail Department of Philadelphia Electric Company received the owner's approval to make a thorough lighting study and prepare a lighting recommendation. William N. Harrison of the Philadelphia Electric Company's Lighting Application Section prepared the report. Realizing that the lighting work was only a portion of the job to be done, he called in Edward B. Barber of Independent Wiring Company to lay out and evaluate the entire electrical distribution system, and to provide a cost estimate on the entire rewiring and relighting recommendation.

Independent Wiring Company examined the original wiring facilities and prepared a layout covering changes to substation, feeders, distribution centers and panels, and all branch lighting circuits. A louvered ceiling was then designed in line with William Harrison's lighting recommendations, and in cooperation with R. H. Biesswanger, local representative for Leader Electric Company. The entire project was then estimated and quoted on, at which time the work was authorized. The lighting equipment was supplied by Graybar Electric Company.

This installation was entered in the Cooperative Fall Lighting Campaign of 1952, sponsored by the Electrical Association of Philadelphia, and won first prize in that competition.

Second Prize

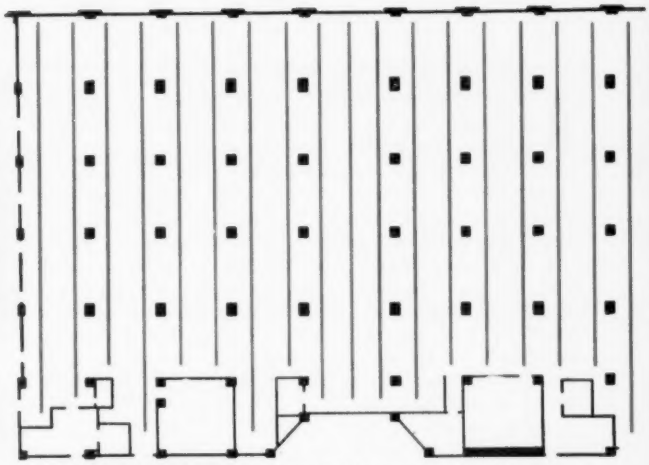
OFFICE LIGHTING

WINNER: T. J. Reilly, Frame Electric Company, Pittsburgh, Pa.

PROJECT: Hospital Service Assn. of Pittsburgh, Pittsburgh, Pa.

58 Footcandles in Office Area

UNIFORM LIGHTING intensity, averaging 58 footcandles, is the result of continuous rows of 2-lamp units in office area.



CONTINUOUS ROWS of suspended, louver-shielded fluorescent units are mounted on 8-foot centers.

AN ABUNDANCE of high intensity, well-diffused fluorescent lighting is today the mainstay of employee efficiency and morale in the expansive office work area of Hospital Service Assn., Pittsburgh, Pa. In this interior, the lighting has been well engineered and carefully suited in quantity and quality to the visual requirements of prolonged close work, record keeping and extensive filing.

The new lighting which replaced an antiquated, low intensity installation of stem-mounted incandescent enclosed globe units, consists of continuous rows of direct-indirect, louver shielded fluorescent fixtures with translucent white plastic side panels. Metal framing of the fixtures is finished in a soft, metallic satin. These units, Wakefield "Grenadiers," are mounted on stems, 24 inches from the ceiling; each is equipped with 2 40-watt bi-pin pre-heat type cool white, General Electric fluorescent lamps.

Construction details of the installation are simple and functional. The 14,800 sq. ft. lighted area has a hung type ceiling. A total of 428 fixtures are used to form the continuous rows which are spaced on 8-foot centers. The complete lighting system, totaling 342.4 connected kw, is divided among 115-volt branch circuits.

Lighting results in the interior fully measure up to the original design objectives. The average intensity is 58 footcandles, with a maximum variation of only 2 footcandles throughout the interior. Luminous side panels of the fixtures, indirect light component, fixture louvers, high reflectance and nonglare finish of the ceiling and other surfaces in the interior combine to provide a high degree of lighting comfort. Brightness ratios are well balanced; direct glare is minimized; and diffused distribution provides shadow-free light.

Initiation of the sale of this lighting installation came about as a result of Frame Electric's progressive business attitude. At the time the Hospital Service Assn. was preparing to leave their old quarters to move to the office area described here, Frame Electric was doing some preliminary work on the electrical modernization of the old quarters. The Hospital Service Assn. inquired of Frame Electric what type of lighting might be installed in the new office area they were soon to acquire. As a result of competent engineering recommendations by Frame, they were retained to make the installation.

The engineers at Frame completely designed and specified the installation in strict accordance with the best recommendations for lighting an area of this type. The sale was completed by Frame Electric with no outside sales assistance.

First Prize | **MISCELLANEOUS**

WINNER: Fay Foster, Stoneburner-Verret Electric Co., Port Arthur, Texas

PROJECT: Merchant's National Bank, Port Arthur, Texas

New Lighting Keys Bank Remodeling

A MODERN new lighting system combining efficient new light sources and artistic lighting design was the key highlight of a remodeling program completed in 1952 by the Merchant's National Bank, Port Arthur, Texas. Featuring luminous ceilings, cove lighting, and recessed fluorescent and incandescent luminaires, the new lighting blends in with the new modern type bank fixtures and interior design, and successfully ties together the various areas of this bank interior. It also provides an even lighting intensity of glarefree illumination in excess of 50 footcandles, adequate for the many and varied seeing tasks carried out in this area.

Before remodeling, the old incandescent lighting system was a group of outmoded glass enclosing globes suspended from a high ceiling of ornate design. It produced a lighting level of less than ten footcandles, was glaring, and was totally inadequate for the seeing tasks faced by both employees and by customers alike. The design of the bank interior was also outmoded, fully out of keeping with the modern treatment of public building design, and the stepped-up tempo of doing business.

In planning the new lighting system, several design objectives were established and met. First, the lighting system had to be attractive in design, and produce a friendly banking atmosphere. The system had to provide a medium level of uniform lighting intensity adequate for the many and varied seeing problems, such as counting money accurately, detailed office work, typing, writing and reading. The lighting had to blend in with new modern type bank fixtures and interior design, and become an integral part of the structure. Further, the lighting should be used to functionally tie together areas of different ceiling heights, and be as dissimilar as possible from that of other banks in the community and not easily copied or imitated.

Certain structural conditions existed which also had to be considered. There was a row of four large columns down the center of the lobby. The ceiling was 18 feet high, and had to be lowered to 16 feet over the public lobby area, and to 10-ft 6-in over other areas. Provision also had to be made for a return air duct for the air conditioning system in the officers' area.

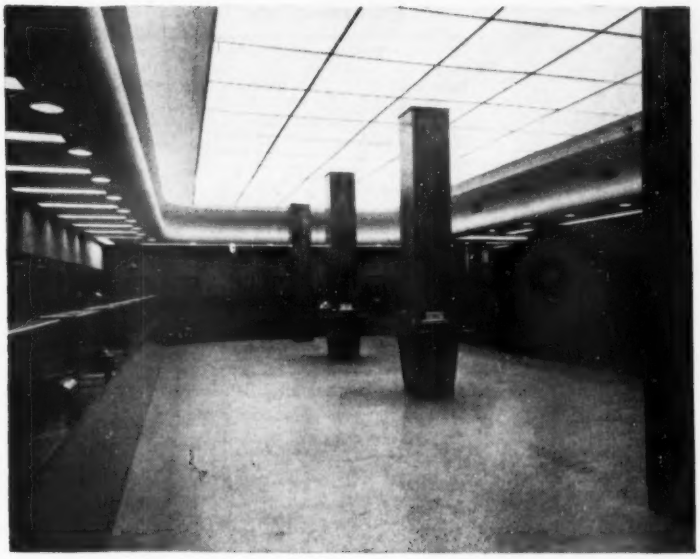
These lighting design problems were all successfully solved by using a combination of modern lighting techniques (see Lighting Layout) and a carefully selected type and make of lighting equipment for each lighting technique.

A corrugated Plexiglas luminous ceiling was used over the public lobby area. This ceiling consisted of 75 white translucent panels, each four feet square, installed in a rectangular pattern 15 panels long and 5 panels wide. It was installed 16 feet from the floor, with an acoustical ceiling border, leaving a two-foot deep plenum above. The plenum was painted white, with a 75% reflection factor. Forty 16-foot long 2-lamp slimline strips were installed on the old ceiling above, spaced 24 inches apart, with the lamps 20 inches above the diffusing panels. These were run in ten parallel rows, each 64 feet long, and were lamped with 80 F96T12/CW slimline lamps.

At the lower edge of the wall area dividing the 16-ft high lobby ceiling and the 10-ft 6-in high ceiling of adjoining areas was installed a cove completely encircling the public lobby area. Cold cathode tubing 25mm. in diameter was installed in this cove, to minimize the contrast between the luminous ceiling, upper wall, and regular ceiling of adjacent areas—consistent with good lighting design. Cold cathode tubing was used because of its extremely long rated life, and because it could be shaped to the contour of the curving cove and would eliminate objectionable shadows which would occur at the ends of standard fluorescent lamps where they are joined for continuous runs.

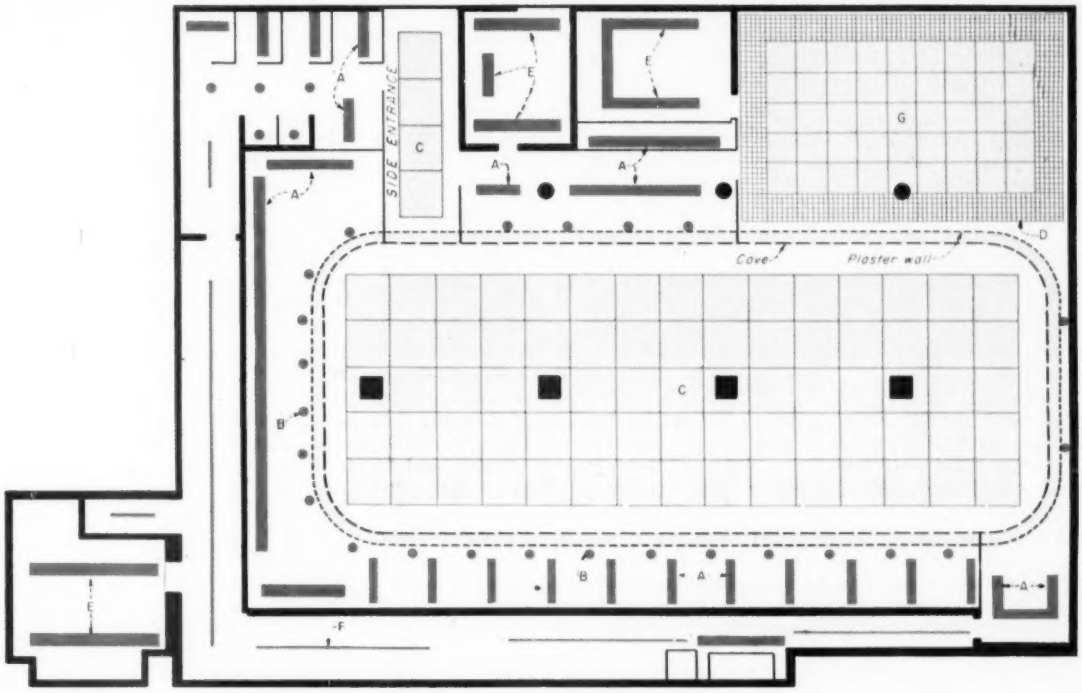
A luminous ceiling with a louvered border was used over the officers' area, adjoining the public lobby, which helped tie the interior design of the entire open area together. In effect, there is no plenum in this area, as the old ceiling is about eight feet above the new suspended ceiling. Slimline light strips in this area were equipped with reflectors. These were installed 24 inches above the plastic panels, and spaced 26 inches on centers. The louvered border surrounding the luminous ceiling area provides passage of return air for the air conditioning system, also provides illumination, and maintains good lighting design practice. A large board was placed over the reflector strips lighting the louvered panel sections, and painted white. This prevents vision up through the louvers to the old ceiling above.

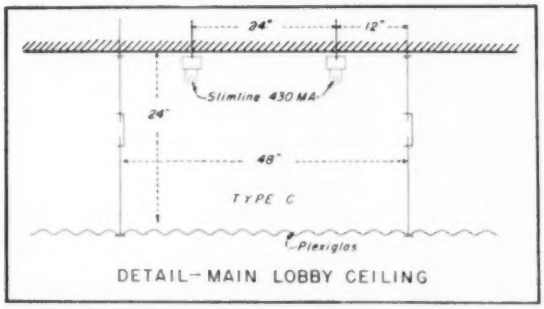
Tellers' areas are at the perimeter of the public lobby area. Recessed troffers equipped with Holophane lenses and slimline lamps are installed over these areas, as well as in adjoining office areas, to provide high level illumination efficiently, free from glare



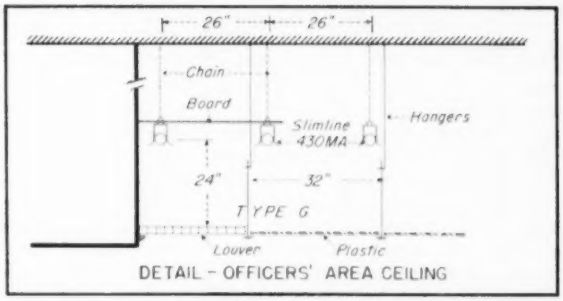
OLD LOBBY had a high, ornate ceiling, was divided by four large columns. Outmoded enclosing glass globes provided less than 10 footcandles of illumination.

MODERN LIGHTING TECHNIQUES provided design basis for remodeling of Merchant's National Bank, Port Arthur, Texas. Luminous ceilings, cove lighting, and recessed luminaires were combined to provide high level quality lighting throughout.





DETAIL—MAIN LOBBY CEILING



DETAIL - OFFICERS' AREA CEILING

LIGHTING LAYOUT reflects intelligent use of various modern lighting techniques, providing a custom design lighting system with standard types of various lighting equipments which harmonize in design appearance.

LUMINOUS CEILING with border of louvered panels lights officers' area. Louvered panels serve as return duct for air conditioning system. Initial light level was 71 footcandles.

Engineering and Technical Data

(Brightness values in footlamberts)

Location	Lobby	Officers' Area	Tellers' Area
Working surface	12	12	14
Floor	17	8	10
Upper side walls	24	20	18
Lower side walls	15	12	11
Luminous ceiling	115	91	
Furniture	9	9	10
Visual tasks	23	23	25

Branch circuit voltage	120 volts
Total lighting load	21.2 kw
Total lighted area	3445 sq. ft.
Average lighting intensity, (Maintained):	
Lobby area	51 fc.
Officers' area	51 fc.
Tellers' area	62 fc.
Reflectances:	
Ceiling	75%
Walls	25%
Floor	24%
Officers' area (red carpet)	10%
Furniture	16%
Office Machines	30%

or annoying shadows. Over the teller's deal plates 150 watt recessed incandescent units, also using Holophane lenses, were installed to provide a higher intensity of light at these locations. These units were equipped with daylight type lamps, so that the color quality of the light from these incandescent units would blend in perfectly with the color quality of the cool white fluorescent light from the troffers and luminuos ceiling.

The principal light source used is the fluorescent slimline lamp, both in the 48-inch and 96-inch lengths. These are of the standard cool white color. This color was selected because there is enough peach color in the decoration of the bank interior to contrast subtly with the cool white light of the lamps, and provide a very satisfactory color quality to the final lighting result which is very pleasing in appearance. Slimline fluorescent lamps were selected for the use in this lighting installation for some very specific reasons outlined by the electrical contractor. These lamps produce light efficiently, and start instantly when the light switch is flipped. They have single pin contact ends, which are used in conjunction with spring tension lampholders and provide more positive electrical contact over a long period of time. They are thereby less affected by jar and vibration. They have a long rated life, help simplify maintenance, and were easily adapted to the lighting systems selected to light this bank.

The lighting equipment used was selected for its ability to provide good quality illumination efficiently, because it harmonized, was modern in appearance, fit in well with the remodeling plans, and was UL- and ETL-approved.

Fay Foster, estimator for Stone-burner-Verret Electric Company, initiated this relighting job and spent many months talking with Jack Craig, vice president of Merchant's National Bank, pointing out the many advantages of good lighting and benefits of such lighting for the bank. Whenever possible, he showed other good lighting installations which his company had made. He also called in Richard A. Landrey, Jr., lighting engineer for the Port Arthur Division of the Gulf States Utilities Company for sales and engineering assistance when the bank officials decided to remodel, and requested Sumner Harris, local representative for Sylvania Electric Products Inc., to explain the benefits and advantages of luminous ceilings to the bank officials; also to supply design and technical information needed to lay out these jobs. He also received assistance from the other manufacturer's representatives whose equipment was used, and the close cooperation of Art Hendler, of the Houston Show Case & Manufacturing Co., Houston, Texas, interior fixture designers. It was through the combined efforts of these trained specialists, spearheaded by the efforts and guidance of electrical contractor Foster, that this well planned and design-coordinated lighting system became possible and was ultimately installed.

The luminous ceilings (Types C, D and G) were supplied complete, including supports, Plexiglas and louver panels, light strips, etc., by Sylvania Electric Products Inc. The recessed incandescent units (Type B) were supplied by Art Metal Company. Recessed troffers (Types A and D) were supplied by Sunbeam Lighting Company, and surface mounted units (Type E) were supplied by Lighting Products Inc. Type F continuous units used in passages and corridors are Sylvania No. C-150 strip units surface mounted. All slimline lamps are Sylvania, and incandescent lamps and cold cathode tubing are General Electric. All equipment was purchased through Worth Electric Co., electrical distributors in Beaumont, Texas.

Fay Foster reports that this light-system received much favorable publicity from the radio, press and personal comments of customers and visitors to the bank. "Many people talk of glarefree and shadowless light," he said, "but this lighting installation comes as close to accomplishing this as any lighting I've ever seen." Many employees of the bank have been asked for their opinion of the lighting in the area in which they work. They all think it is the very best. They are able to carry on their work more efficiently than in the past, and eye complaints have been practically eliminated.

Many customers have been attracted to this bank by the lighting, and bank officials still comment on how well pleased they are with the entire installation. These results once again prove the benefits of using quality equipment incorporated with properly engineered lighting design.

Third Prize | **FLOODLIGHTING**

WINNER: Donald Press, Flood-Lite Service Inc., Los Angeles, Calif.

PROJECT: City of Cars, Los Angeles, California

Lighting the Way to Used Car Sales

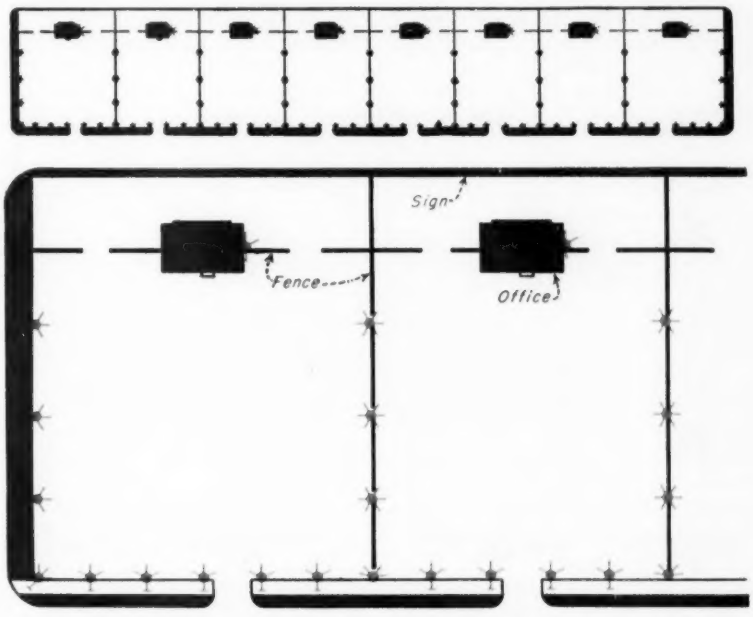
FLOODLIGHTING what is probably the largest multiple used car lot project in the United States required an installation by Flood-Lite Service, Inc., of Los Angeles, consisting of 430 main floodlights of from 300 to 1500 watts each and with a total light output sufficient to light a town of 3,000 people.

Lighting the eight individual used car lots of *City of Cars* in Los Angeles, which occupy an area 1274 feet by 212 feet, requires a connected load of 505.42 kw. The main floodlights, some manufactured by Benjamin and some by Smoot-Holman, were wired for 1500 watts and installed the length of the project at a 20-foot mounting height. Stonco lampholders with 300-watt lamps were added on the same poles at a height of 12 feet and focused on the vertical chromium grille surfaces of the cars on the front line. By this method a difference of illumination was created from the front to the rear of the lot to introduce contrast and thereby attract the attention of passing pedestrians and motorists. The vertical fronts of the first-row cars boast an average of 310 ft.-c., while intensities on the top front of the hoods measure 100 ft.-c. for the first row of cars, 30 for the second row, and 20 for the third row. The 1500-watt units used at the rear of each lot were mounted at 25 feet and throw a wide beam to illuminate the work area.

Feeding the floodlight circuits are eight 400-ampere main service panels manufactured by Mullenbach Electric Co. and equipped with Westinghouse Quik-Lag breakers.

The 2- and 4-lamp 40-watt fluorescent pan units used in each of the eight sales offices provide soft trouble-free illumination for closing the sales.

FLOODLIGHTS turn midnight to high noon for Los Angeles' City of Cars. This 8-lot multiple used car lot is the largest of its type, brings a large array of used cars together in one location for convenience of prospects.



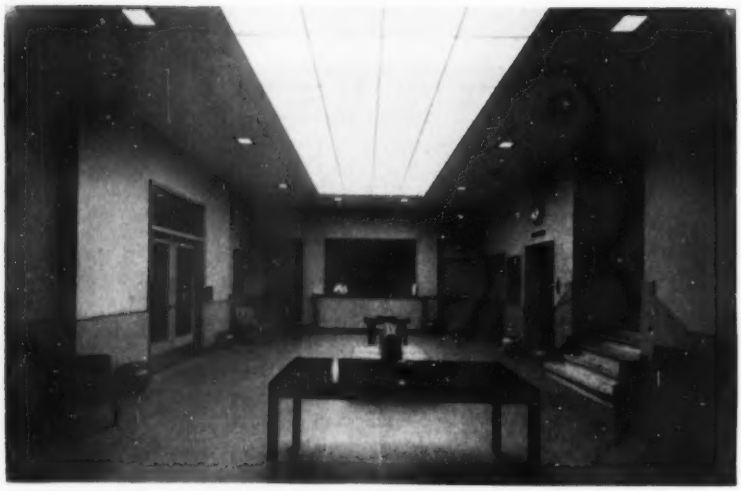
LAYOUT of complete project showing 1,250-ft long multiple lot ground plan. Enlarged plan shows 175-ft corner lot and typical 150-ft interior lot.

Second Prize

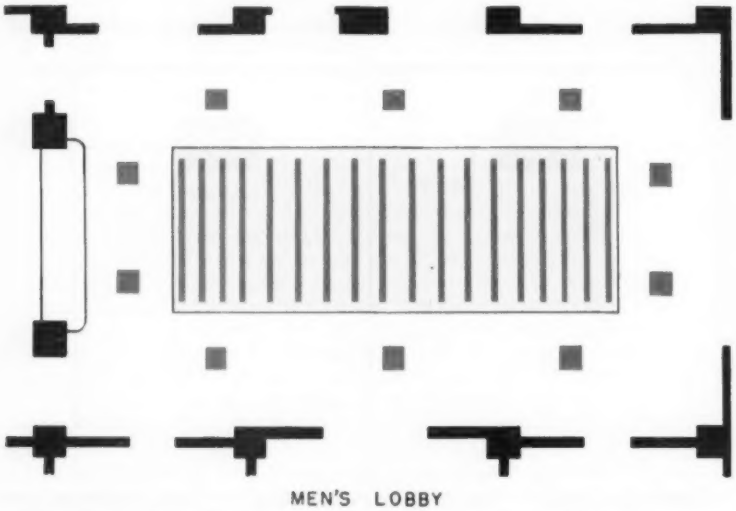
MISCELLANEOUS

WINNER: George A. Denner, Clement Electric Co., Grand Rapids, Mich.

PROJECT: YMCA Building, Grand Rapids, Mich.



LUMINOUS CEILING and recessed incandescent units are combined to provide simulated outdoor atmosphere in Men's Lobby, YMCA Building, Grand Rapids, Michigan.



LIGHTING PLAN for Men's Lobby. Two-circuit wiring control for both incandescent and fluorescent units provides wide flexibility in lighting results.

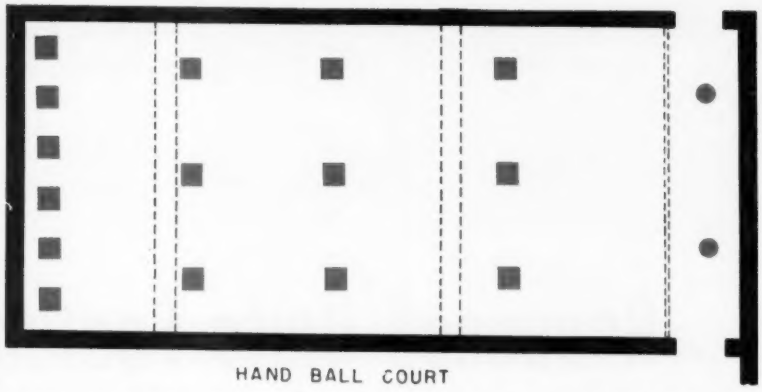
Light Modernizes

WHEN visitors to Grand Rapids' YMCA now enter the lobby it is not at all surprising to hear them comment about the naturally lighted outdoor lobby inside this building. The appearance is truly deceiving. Installed in the center of the ceiling is a fluorescent lighted luminous ceiling panel nine feet wide by 26 feet long which, to the layman, certainly appears to be a natural skylight. The deception is even increased, due to the natural sunlight appearance of the light from cool white fluorescent slimline lamps which floods through the white diffusing panels of the luminous ceiling from the plenum area above. This color quality of the light shows up in sharp contrast with the yellowish light from recessed incandescent units installed around the sides and ends of the luminous ceiling panel.

This effect is not accidental, however. It was planned that way. The fluorescent and incandescent units were used in combination to provide a good balance of the color quality of the combined light, and to provide a warm, cheerful, inviting and natural atmosphere for visitors or members upon entering the lobby from the outside. It presents an artistic appearance with harmonious treatment of lighting design which conforms and blends well with the architectural design of the building.

This new lobby lighting system was

RECESSED INCANDESCENT units light the handball court.



LIGHTING PLAN for handball court. Playing wall is high-lighted by six 200-watt recessed units located near the wall.

Men's Lobby and Handball Court

completed in December, 1952, in time for the Christmas holiday season. It was part of a complete renovation of the building with adequate electrical service and lighting to bring the building up to modern recommended standards, from both an artistic and practical point of view.

Clement Electric Company, Grand Rapids electrical contractors, handled the entire electrical work for this modernization project. They not only installed the new wiring and lighting, but did the complete engineering and layout work. When the program was announced in the local newspaper, they contacted the general contractor selected for the job, and were successful in securing the contract for engineering, design, layout and installation.

The old lobby had high ceilings with exposed beams, and did not conform to present architectural treatments. A new ceiling was installed to accommodate the combination luminous ceiling and recessed incandescent lighting units. A total of 18 75-watt General Electric slimline lamps, installed on DayBrite No. 99140-S wiring channels, are suspended above the diffusing panels of the luminous ceiling (see drawing), and are wired on alternate circuits to provide two-level lighting intensity. Installed around the luminous ceiling are ten DayBrite No. RS851-RHV recessed units with Controlens, each lamped with one 150-watt incandescent lamp. These units are also wired on alternate circuits and separately switched, so that they provide an even distribution of low level lighting when the luminous ceiling panel is not in use. Thus various levels of lighting intensity are possible, up to the maximum average of 40 footcandles with all lights turned on.

Brightness values of lobby surfaces range from 4.7 footlamberts on the ceiling to 200 footlamberts for the luminous ceiling panel, and to 390 footlamberts on the Holophane Controlens on the incandescent units. Brightness of the lobby walls is 9.5 footlamberts, approximately equal to the floor brightness.

Another outstanding feature of this modernization program is the relighted handball court. Its appearance upon entering is a handball enthusiast's dream come to reality. An average intensity of 20 footcandles of well balanced, uniform illumination floods the room. Ability to follow the ball throughout the court is now possible with this shadow evading installation.

Before renovation, the handball court had a high ceiling with no space available for recessing suitable type lighting units. It was formerly lighted with industrial type metal reflectors protected by wire guards, which produced extreme glare from exposed lamps and interfered with the players' vision and ability to follow the ball. Also, the intensity was too low to permit the player to see the quickly and easily as required.

This lighting problem was solved by installing a new suspended ceiling lowered sufficiently to permit the proper type of recessed incandescent units to be mounted flush in the new ceiling. Fifteen Kirlin No. 1212 SR 200 watt units, each equipped with shatterproof glass, were selected to light this court. Six units are used in the ceiling near the playing wall to highlight this area (see drawing) and nine units are properly spaced to uniformly light the playing area away from the wall. Two RLM units light the entrance area below the balcony, at the rear of the court.

In planning the lighting for the lobby and handball court, several methods and sugestions were considered. Because of the importance of the lighting in these two areas, both the general contractor and the YMCA board of directors offered various solutions. After careful analysis of the layouts proposed by the electrical contractor, however, these were approved and accepted for their lighting adequacy, technical design and practical features conforming with good modern practice. All lighting equipment and supplies were furnished by General Electric Supply Company, Grand Rapids.

Second Prize

STORE LIGHTING

WINNER: Lyle E. Johnson, Juneman Electric Co., Inc., Birmingham, Ala.

PROJECT: Second Floor, Loveman, Joseph and Loeb, Birmingham, Ala.

Recessed Units Feature Comfort

WHEN Loveman, Joseph and Loeb, Birmingham department store, decided to remodel their second floor, they called on Juneman Electric Co., Inc., local electrical contractors, to design an outstanding lighting system for this area, suitable for an exclusive series of designer's salons. This was only natural, since Juneman Electric only a year earlier had effectively relighted the third floor of the same store, using their own lighting layout based on an unusual pattern of 8-foot slimline fluorescent luminaires.

The lighting design objectives outlined by the department store officials were that the lighting be inconspicuous, that it provide ample illumination for easy seeing, that it be visually comfortable, and that it provide for best color rendition of pastel colors.

Field trips were made to New York, St. Louis, Chicago, Atlanta and New Orleans to inspect lighting systems in other similar sales areas. This resulted in many helpful ideas, but none were completely satisfactory. Based on all comments and ideas up to that point, Juneman Electric submitted a recommendation for a recessed downlight lighting system using reflector lamps operated at full rated voltage for best color quality of lighting. The store officials instructed that one bay area, 24 feet by 24 feet, be installed. After one look at the finished installation, they gave the "go ahead" for the entire job.

The new lighting system is composed of recessed downlights, principally Gotham No. 577-R, with flat matte finishing rings which were painted the pastel color of the overall ceiling. Flood and spot PAR-38 General Electric reflector lamps were used in combinations to highlight certain displays as required. In some areas, where rearrangement of displays are frequent, Century "Eye Ball" recessed units of the adjustable type were used, to permit flexibility.

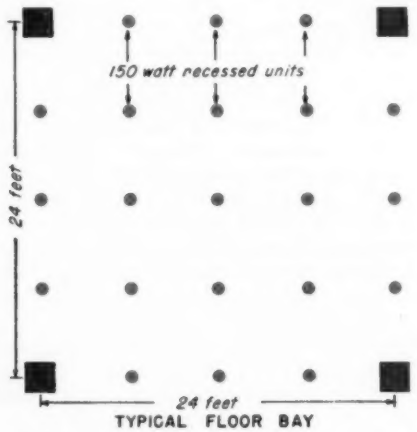
The flexibility of spots or floods in any bay area is supplemented with high level lighting in the display cases.

The initial illumination intensity was 35 footcandles of shadowless warm lighting throughout the 34,000 square foot area, of a color quality that is nearly perfect for color matching. Special consideration was given to voltage drop of the supply circuits to assure that the light from the reflector lamps be as "white" as possible.

Store officials report that visitors from other stores, many from national chain stores, when asked what impressed them most with the entire remodeling program, have said "The lighting is superb—we have seen nothing like its effect."

J. B. Aiello, general superintendent for the store, cooperated with Juneman Electric Co. in the design of this lighting system. The lighting equipment was supplied by Matthews Electric Supply Co., Birmingham.

RECESSED LIGHTS concealed in ceiling provide 35 footcandles of comfortable lighting of good quality inconspicuously on the second floor of Loveman, Joseph and Loeb's department store in Birmingham, Ala. Incandescent reflector spot and flood lamps are used throughout.



LIGHTING LAYOUT for typical bay area is based on 150 watt PAR-38 reflector lamps spaced six feet on centers.

COVE LIGHTING for effect and ceiling reflector-floods for coverage has brought new popularity to Slovak club.

DINGY ATMOSPHERE with old lighting was inadequate for sports, made lady members reluctant to schedule social events.

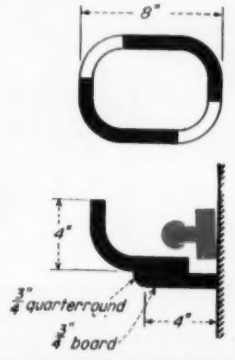
THE LIGHTING COMPETITION

Third Prize

MISCELLANEOUS

WINNER: Leo Stacer, Stacer Electric Co., Homestead, Pa.

PROJECT: Slovak Sokol Club Room, Homestead, Pa.



STANDARD RAINSPOUT (top) was cut as shown to provide curved surface for cove assembly (bottom).

Light Puts Life in Social Club

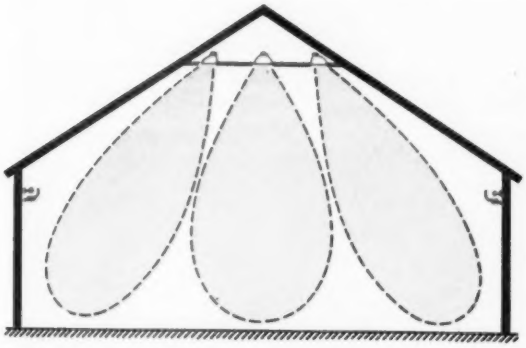
A NEW lighting installation in the Slovak Sokol club room in Homestead, Pennsylvania, has put new life into the membership and has brought many delinquent members back into active participation in the organization.

Primarily responsible for the change was Leo Stacer, a social member of the club and owner of Stacer Electric Co. in Homestead, who was asked to improve the inadequate system.

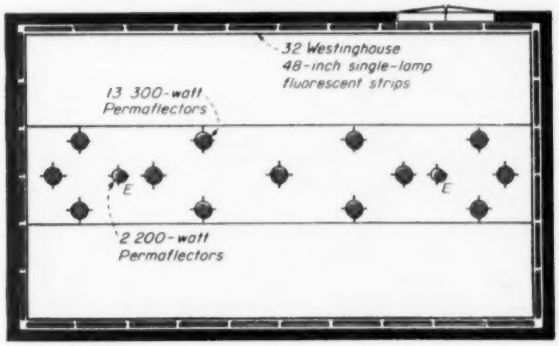
The principal target for the new system was to be flexibility; the old lighting was of necessity the same at all times, whether the scheduled activity was gymnastics, volley ball, dancing or a party.

To satisfy the athletic requirements, electrical contractor Stacer provided Pittsburgh Permaflectors mounted in the ceiling. Fluorescent cove lighting, consisting of Westinghouse 48-inch strips, was installed with separate switching for the lower intensity decorative light desired for social activities.

The cove itself was constructed by cutting lengthwise a standard wooden rainspout (see sketch).



DISTRIBUTION CURVES show symmetric and assymetric coverage of room area provided by 300-watt Permaflectors.



FLUORESCENT STRIPS completely encircle the four walls; reflector-floods provide 35 fc for sporting events.

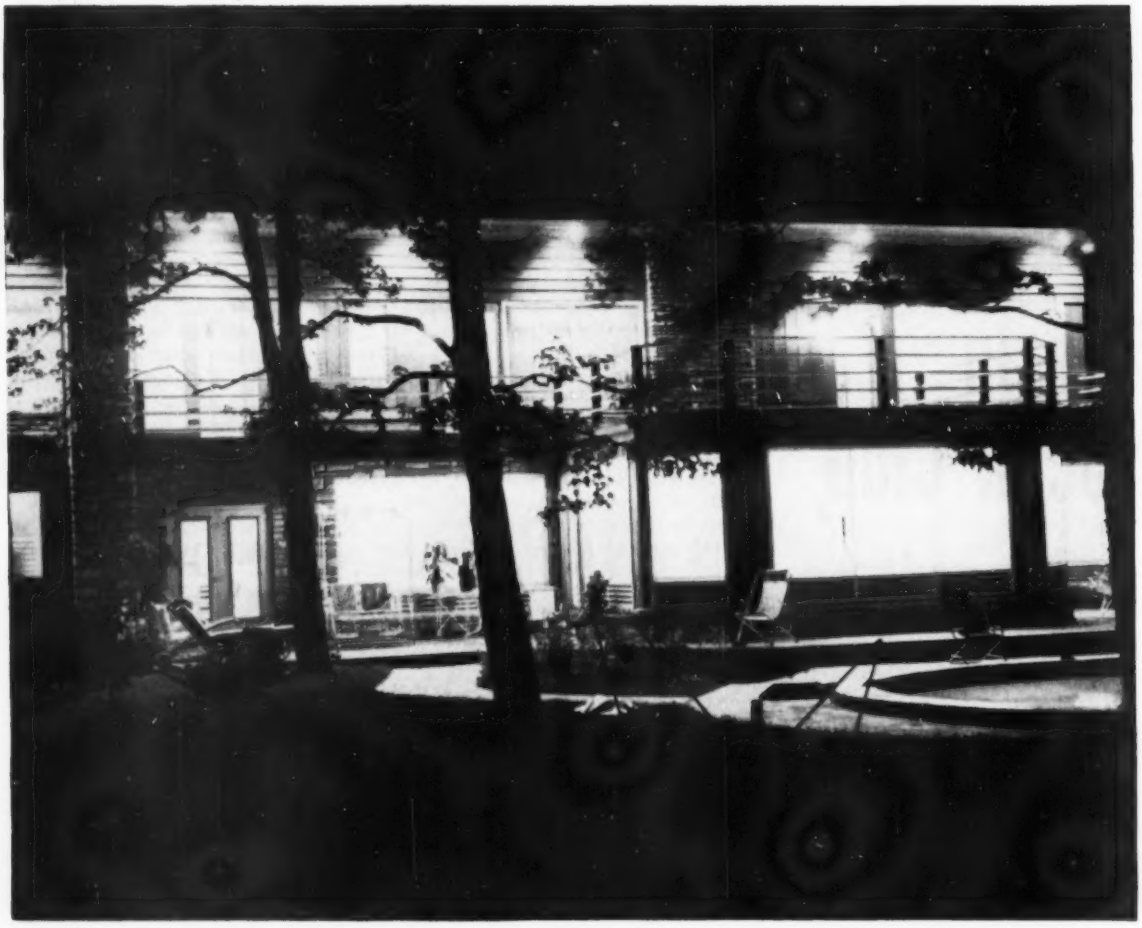
Second Prize

RESIDENTIAL LIGHTING

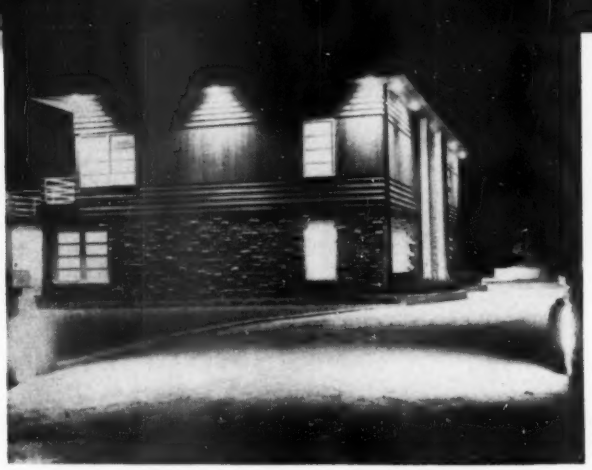
WINNER: Robert Smith, Jr., Electrical Contractor, Philadelphia, Pa.

PROJECT: H. B. Robinson Residence, Rydal, Pa.

Lighting Luxury Indoors and Out

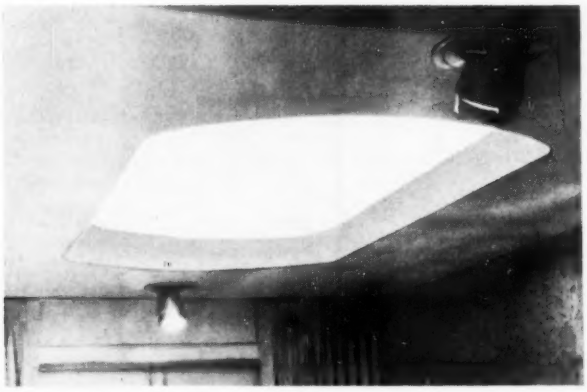


LOUNGING AREA at rear of house is well-illuminated by fixtures recessed beneath roof overhang and by interior window valance lighting. A lighted swimming pool and other decorative exterior lighting adds more charm to the scene.

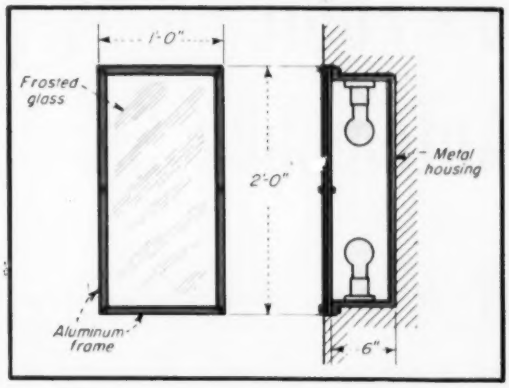


DRIVEWAY is flooded by incandescent lamps recessed in stone wall on either side of entrance.

LIVING ROOM lighting features incandescent adjustable spots and window valance fluorescent fixtures.



BREAKFAST ROOM cove lighting is accentuated by two adjustable spots, permits flexible lighting effects.



DETAILS of recessed fixtures for driveway entrance.

MODERN lighting inside and out has made the H. B. Robinson residence in Rydal, Pennsylvania, a prime example of visual luxury. Electrical Contractor Robert Smith, Jr., of Philadelphia, initiated, engineered and installed the 12 kw system.

Living room ceiling fixtures are Swivelier adjustable incandescent surface-mounted spots, positioned to accentuate the grand piano and floor-to-ceiling natural stone fireplace. Other ceiling fixtures throughout the home are Litecraft 150-watt R-40 flush recessed incandescent units, chosen to meet customer's specifications that drop lights or hanging fixtures be avoided as being out of harmony with the home's architectural and decorative patterns, and that the fixtures used require little maintenance and cleaning. There are 70 of these units installed throughout the house.

All windows were provided with fluorescent valance lighting, the 40-watt single-channel fixtures being manufactured by P & F Lite Company, Philadelphia. Rapid-start warm white lamps were chosen to be in keeping with the pastel-colored walls.

One complete wall of the bathroom is mirrored, lighted over the top by two single-tube, 96-inch, 430-ma slimline channels plus two vertically-mounted recessed 2-tube fixtures with 24-inch, trigger-start, cool white lamps behind frosted glass panels.

Fluorescent cove lighting in the breakfast room, using 20- and 40-watt rapid start warm white tubes in Litecraft single-lamp channels, is supplemented by two Swivelier adjustable surface-mounted units for spotting.

Only two hanging fixtures are used in the home, both being custom-made by Litecraft Manufacturing Corporation of New York. A pendant fixture in the children's room may be raised or lowered as needed, its light bringing a sparkle to the star-covered papered ceiling. Probably the most elaborate and striking fixture in the home is that suspended over the center hall and staircase. It consists of 24 tubular stems extending radially from a spherical aluminum hub, each stem terminating in a 15-watt G-16½ candelabra base frosted white lamp bulb.

Although the window valance lighting spills generously onto the outdoor living area surrounding the residence, additional downlights with 150-watt PAR-38 flood lamps were recessed into the underside of the roof overhang, lending added brilliance and texture to the stone walls. Other exterior lighting includes provisions for floodlighting any portion of the grounds, two 1,000-watt floodlights in swimming pool area, recessed incandescent lamps behind frosted glass panels in masonry walls at entrance to driveway, and a center flower bed containing 40 6-watt clear bulbs giving a star-like twinkling appearance to the branches of the bushes to which they are attached. Outdoor circuits may be controlled either from the front door or from the second-floor master bedroom by means of three-way switches, which, like others throughout the home, are of the silent mercury type.

The installation, providing an average of 35 footcandles over the 3,024 square feet of lighted area, is a tribute to the progressive ideas of both the customer and the contractor and attests to the satisfactory relationship created over a five-year period of association between the two.

First Prize | **INDUSTRIAL LIGHTING**

WINNER: William G. Stockhausen, The Central Electric Co., Baltimore, Md.

PROJECT: Anderson Chevrolet Motors, Inc., Baltimore, Md.

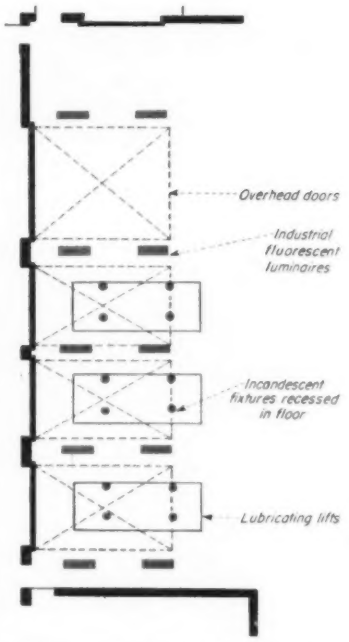
35 Footcandles for Automobile Servicing

WORKING to furnish mechanics of the Anderson Chevrolet Motors Inc., of Baltimore, Maryland, with a high level of illumination for their repair activities as well as to create an installation possessing customer appeal, William G. Stockhausen, proprietor of the Central Electric Company, also of Baltimore, sat down with the establishment's owner and his consulting engineer and agreed on a lighting plan that ultimately called for a total of 169 Westinghouse industrial-type fluorescent fixtures plus an assortment of incandescent units for the two floors of automobile service and repair activities.

Four rows of individual luminaires mounted flush against the long span steel joists of the first floor ceiling furnish light which, reflected from the light green walls, brick red floor and aluminum-painted joists, provide illumination sufficient for all work except that required beneath the cars. The rows of fixtures directly over the car spaces, each of which contains a lift, are on 19-foot centers; the spacing between the rows on each side of the main aisle is 16 feet. Four similar rows on the second floor, using identical spacing, provide a higher level of illumination over working areas because of a lower ceiling height.

Three lifts at one end of the first floor are used for lubrication and oil change. Ten fluorescent units, spaced in pairs on each side of the overhead doors, provide general lighting for the operations, while Crouse-Hinds incandescent fixtures recessed flush into the floor flood the entire undersides of the cars on the lifts. These fixtures are provided with special Herculite glass lenses to protect the units from damage from moving cars as they approach the lifts.

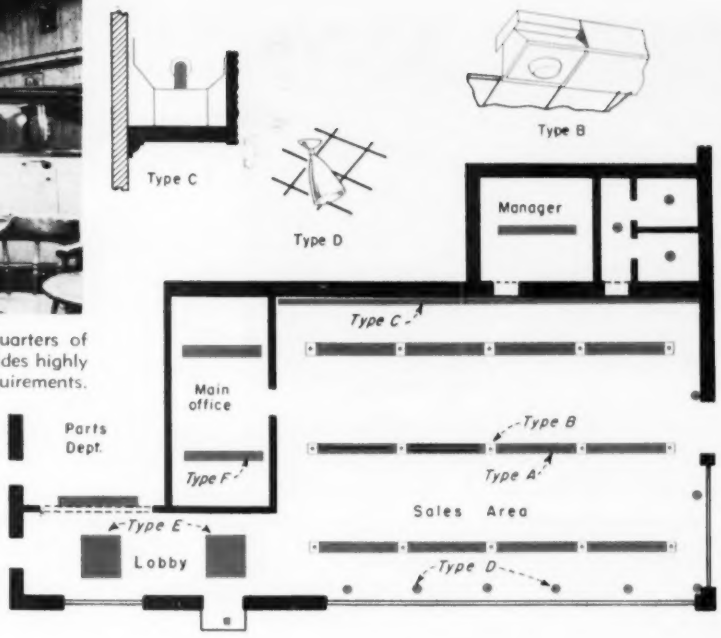
The entire installation, requiring 27 kw, lighting 32,000 sq ft of floor space and providing an average of 35 footcandles, creates an atmosphere that makes customers feel they can better appreciate what is being done to restore their cars to good operating condition.



LUBRICATING RACKS at one end of first floor are illuminated from above by fluorescent fixtures spaced between overhead doors and from below by incandescent units recessed in floor.

INDUSTRIAL LUMINAIRES running the length of the automobile service area provide general illumination for all but underside service and repair.

CUSTOM PLANNED lighting features new quarters of Waldoboro Garage Co., Rockland, Maine, provides highly flexible lighting results to meet varying requirements.



LIGHTING PLAN utilizes variety of lighting equipment types for 1200 sq. ft. area, was promoted by electrical contractor Francis E. Havener.

Third Prize | **STORE LIGHTING**

WINNER: Francis E. Havener, Electrical Contractor, Rockland, Me.

PROJECT: Waldoboro Garage Company, Rockland, Me.

Lighting Flexibility for Auto Salesroom

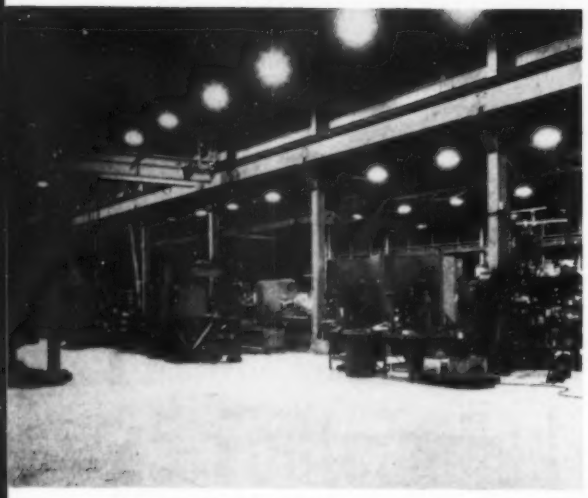
THE Waldoboro Garage Company, located on Route 1, Rockland, Maine, has since mid-June 1953 been in new quarters which feature outstanding lighting for its sales and service areas. Not only are illumination intensities far above the local standards, but the lighting flexibility provided for this 1200 square foot area is also a feature of distinct merit.

Various lighting equipment types were used to solve this problem. A continuous fluorescent cove traverses the rear wall. Three continuous rows of Sylvania 3-lamp slimline fluorescent troffers, with 8-foot sections separated by adjustable spotlight units, were recessed in the ceiling of the main display sales area. These troffers are wired for one, two, or three lamp control, and the spotlights are separately controlled. The lobby area is effectively lighted by two DayBrite flush 4 ft. by 4 ft. louvered units.

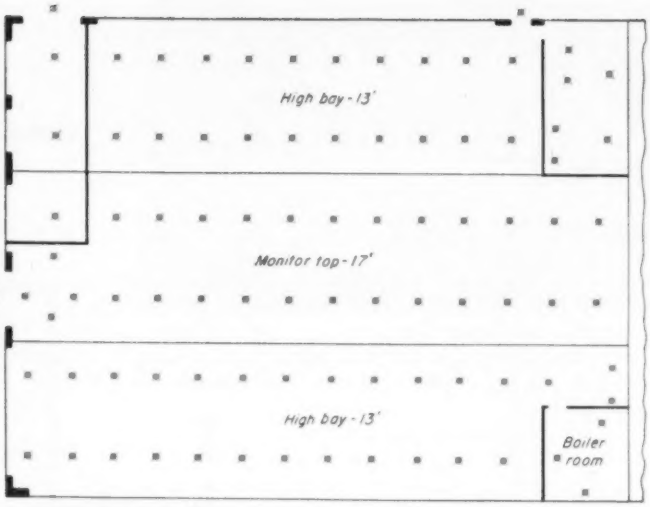
Electrical contractor Francis E. Havener, who has done work for garage owner John H. Miller for several years, won this contract on merit of past services. Working with Robert Anderson, lighting engineer for Central Maine Power Company, and Andy Fulle, local representative for Sylvania Electric Products Inc., Mr. Havener promoted this custom planned job from the start. All equipment was supplied by the Geo. Gowell Co., of Lewiston, Maine.

Lighting Results in Footcandles

Sales Area — 1 Lamp per row	29
— 2 Lamps per row	50
— 3 Lamps per row	76
— All Lamps and spots	162
Parts Dept. Counter	80
Lobby	55
Manager's Office	50
Main Office	45



HIGH BAY LIGHTING in the industrial plant of the Goodrich Welding Equipment Corp., Hudsonville, Mich., provides high level, shadow-free illumination.



LIGHTING LAYOUT shows the mounting arrangement and spacing of the incandescent reflector units, including the units outside doorways.

THE LIGHTING COMPETITION

Second Prize

INDUSTRIAL LIGHTING

WINNER: William Hertel, Jr., Hertel Electric Company, Grand Rapids, Mich.

PROJECT: Goodrich Welding Equipment Corp., Hudsonville, Mich.

High Bay Lighting in Industrial Plant

A HIGH, comfortable level of well-diffused incandescent lighting today provides near-optimum seeing conditions throughout the high bay industrial plant of the Goodrich Welding Equipment Corp., Hudsonville, Mich. Here, the individual lighting units are mounted in rows on equal spacings along the ceiling of each high bay area.

The electrical contractors, Hertel Electric Company, Grand Rapids, Mich., engineered this completely new lighting installation to properly fulfill the design objectives—a high, even level of comfortable illumination, with strong vertical as well as horizontal light components. The precise nature of the wide variety of machine tool operations and the hazards to machine operators under poor lighting conditions required an even, shadow-free lighting result. And in addition to the exacting characteristics of the lighting result, ease of relamping and fixture maintenance were prime considerations in the design of the installation.

As shown in the photo, the plant interior is of steel-column and steel-joist construction with masonry walls and floor. Each of the fixtures mounted on the high bay ceilings and the monitor top is an RLM turn-lock reflector type, Miller No. PXEDD 500, with a 500-watt incandescent lamp. This lighting system was selected for its well-known economy and effectiveness in high bay area lighting. The system consists of 120-volt branch circuits and represents a connected load of 36 kw. The average lighting intensity in the area is 25 footcandles. The light colored floor, wall and other surfaces have high reflection factors which eliminate objectionable brightness ratios and contribute to the overall comfort of the lighting.

Sole credit for initiation of the sale of this installation belongs to the staff at Hertel Electric. On the basis of previous work with the owner at Goodrich Welding Equipment Corp., Hertel was offered the opportunity to submit a complete layout of the installation. From that point, Hertel Electric worked out the final result.

Third Prize

OFFICE LIGHTING

WINNER: Frank R. Haubelt, F. R. Haubelt Electric, Pittsburgh, Pa.

PROJECT: Convair, Inc., Pittsburgh, Pa.

Lighting an Engineering Office

A RELIGHTING installation of continuous row fluorescent units today provides all the advantages of correct illumination in the engineering and executive offices of Convair, Inc., designers of escalator and conveyor systems, Pittsburgh, Pa. Here, an even intensity of 50 footcandles of illumination prevails throughout the interior, with maximum conditions of visual comfort.

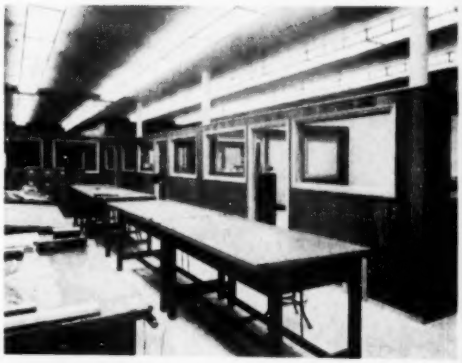
Prior to the new installation, the 2520 sq. ft. area in this interior was occupied by a photographic concern. The lighting system was completely inadequate to meet the more strenuous seeing requirements of office work. Relighting, therefore, was designed to provide at least 50 ft-c on working surfaces, with even light distribution.

Structural characteristics of the interior determined fixture layout. Inasmuch as the enginering office area was divided by partial partitions, it was possible to mount the units in continuous rows across partitioned areas. As a result, the lighting level is unusually even and brightness levels are more comfortable. The basic fixtures used are Mitchell Module units equipped with Rapid Start 40-watt Westinghouse lamps.

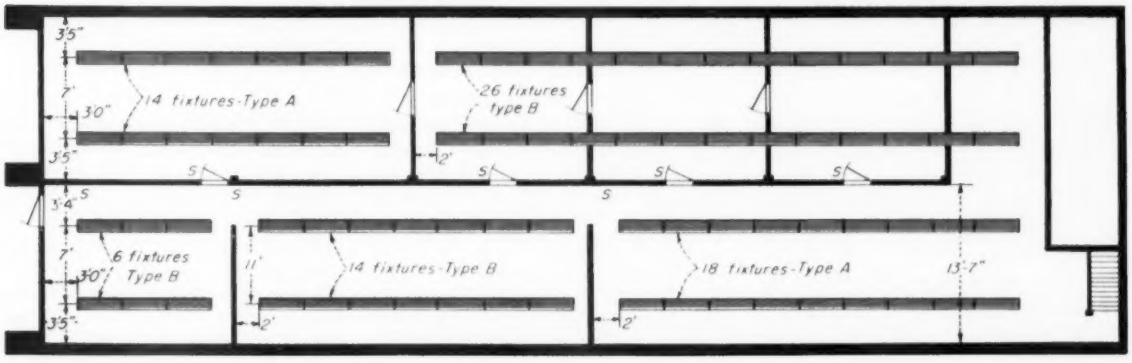
Technical data on the installation is as follows:

Branch circuit voltages	115w
Total connected lighting load	11kw
Number of fixtures	78
Number of lamps	220
Reflection Factors. Ceiling	85%
Walls	65%
Floor	40%
Furniture	30%

Initiation of the sale of this installation was made by the electrical contractors, Haubelt Electric, who were requested by the owner to submit a cost estimate on new wiring, lighting equipment and installation. In the manner of effective industry cooperation, the local utility was asked to make a survey and to submit a plan for the lighting and wiring. Haubelt then submitted to the owner the cost estimate on the basis of the plan which the utility provided. Upon approval of the plan and estimate, the installation was made in accordance with the plans. Sales and engineering assistance was given by E. Dunlap, commercial representative for the Duquesne Light Company, and by Mr. Ecoff, for Keps Electric Co., electrical wholesalers who furnished the lighting equipment.

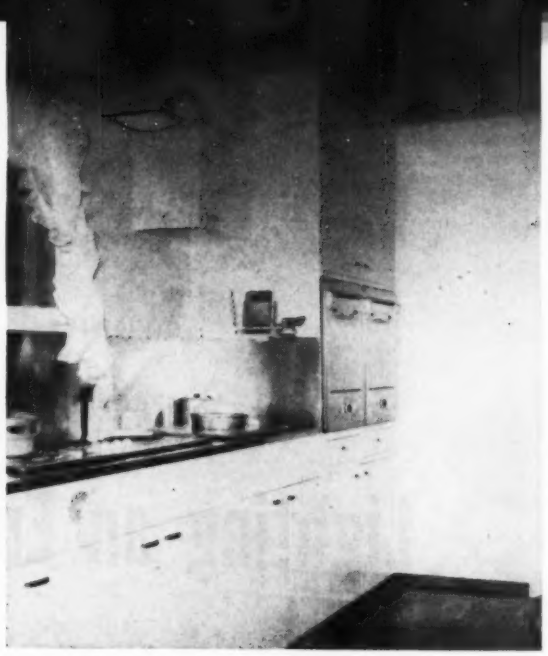


MODERN LIGHTING combines a 50-footcandle average intensity with minimum direct glare and comfortable brightness ratios in the engineering offices of Convair, Inc., Pittsburgh, Pa. Fixture is louvered with luminous side panels.



PARTITIONED OFFICES are lighted with continuous runs of fixtures: Type A—4-lamps, 48-in., 40-watt Rapid Start, standard cool white; Type B—2-lamps, 48-in., 40-watt Rapid Start, standard cool white.

OPEN VERANDA may be lighted by R-40 recessed floodlights for card games, ping pong and other activities, while coach-type wall brackets provide softer atmosphere.



KITCHEN work areas and built-in electric appliances enjoy concentrated light of square Markel incandescent fixtures recessed in ceiling.

Third Prize

RESIDENTIAL LIGHTING

WINNER: George Meese, George Meese Electric Co., Carlsbad, Calif.

PROJECT: Emma Coats Residence, Carlsbad, Calif.

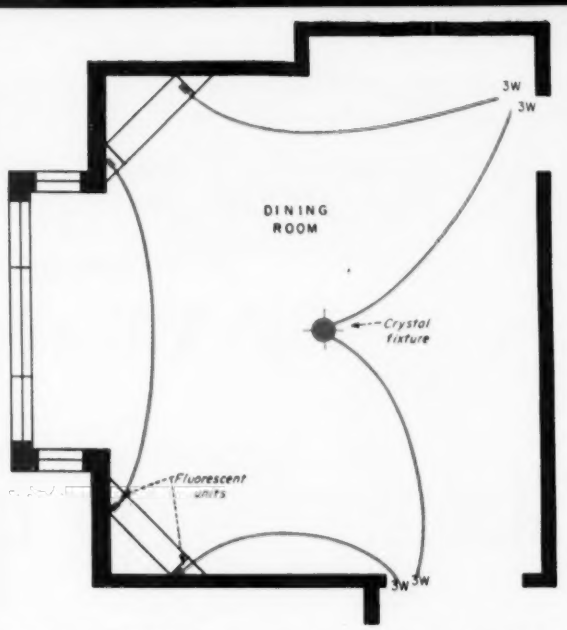
Diversified Light for Modern Living

FLUORESCENT fixtures and custom-made decorative incandescent units combine to furnish the residence of Mrs. Emma Coats of Carlsbad, California, with lighting that fulfills all the requirements of modern living. While a complete lighting system was installed in the home this spring by the George Meese Electric Company, also of Carlsbad, of special interest is the manner in which the lighting of the kitchen, dining room and open lanai was handled.

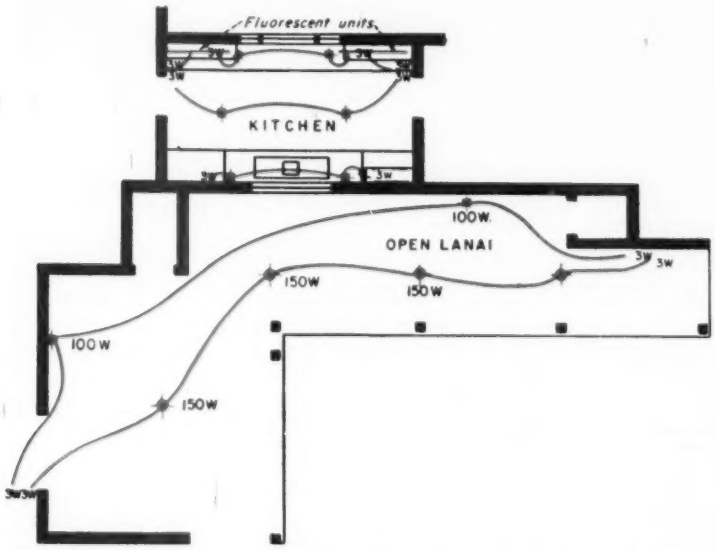
To provide general illumination for the kitchen as well as concentrated light over built-in surface cooking range, wall ovens, waste disposer and automatic dishwasher, six recessed Markel square 100-watt recessed incandescent fixtures were installed, spaced so as to give evenly-distributed lighting, plus two Markel fluorescent units using single T-12 24-inch cool white standard preheat lamps, recessed under cabinets for illumination of sink drainboard. All lights are controlled from ten conveniently-placed three-way switches. Shielding of the units has eliminated glare and excess brightness, enhancing the beauty of the asphalt tile flooring.

The atmosphere provided the dining room by period furnishings and wood paneling has been preserved by the use of a custom-made suspended ceiling fixture, using four 100-watt incandescent bulbs in a setting of imported Czechoslovakian crystal. An expensive collection of imported curios

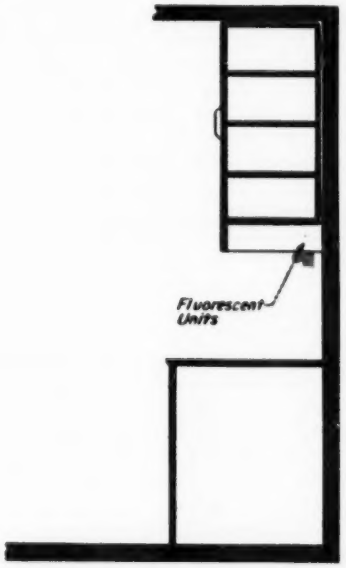
DINING ROOM built-in cabinets holding collection of imported curios are enhanced by vertically-mounted fluorescent units with removable frosted glass covers.



CEILING FIXTURES of imported crystals and fluorescent fixtures in built-in dining room cabinets are controlled by separate three-way switches.



LIGHTING FIXTURES of kitchen and open lanai are controlled by three-way switches. Recessed units over work areas are switched separately from ceiling lights, as are flourescent units under cabinets.



SECTIONAL VIEW showing installation of fluorescent units over drainboard of dishwasher and Disposall.

displayed in two built-in corner cabinets of the dining room has been given attractive prominence through the use of recessed Markel fluorescent units mounted vertically inside the cabinets, their 48-inch T-12 lamps being shielded by removable frosted glass covers.

Two independent systems were used to light the open lanai, or veranda. For card playing, ping-pong, or other activity requiring a substantial amount of light, the recessed R-40 floodlights in the ceiling may be switched on, while independently-controlled custom-made coach-type wall brackets provide the atmosphere for lounging or visiting. Each system may be controlled from either of two locations.

All convenience outlets in the home are of the triplex type with at least two circuits to each outlet, one of the plug-in sections being switched. All plates were painted to blend with the particular wall or panel on which they are located.

The lighting system, requiring a total power rating of 31.5 kw, is unique with 64 three-way and 14 four-way switches. The array of control presented by this multiple switching attests to the many lighting combinations possible over the 2035 square feet of living area.

The opportunity to create this unusually large installation was afforded Mr. Meese by the recommendation of a satisfied previous customer plus his own initiative and lighting know-how in selling his ideas.

Third Prize

INDUSTRIAL LIGHTING

WINNER: James Maniscalco, Electrical Contractor, Norristown, Pa.

PROJECT: Norris Iron and Wire Works, Bridgeport, Pa.

Mercury Lighting for Steel Fabrication

MERCURY vapor lighting today provides a visual environment engineered in quality and quantity for the work performed in the layout department of the Norris Iron and Wire Works, Bridgeport, Pa. The new lighting installation fulfills the design objectives of high level, glare free light for reading blueprints and doing layout work on sheet steel.

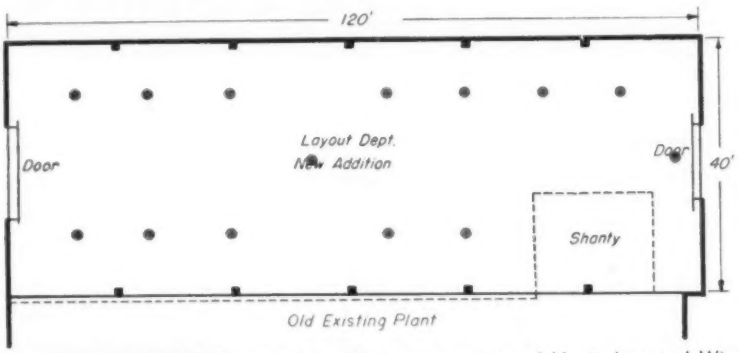
At this plant, the layout department occupies all of a new 40-foot by 120-foot addition to the main plant. The three outside walls of the section are of cinder block construction, 18 feet high, with windows along the top 3 feet of the walls. On the side joining the main plant the section is completely open. The roof of the section is supported by large cross trusses, 6 feet high in the center of the building. The bottom of the truss structure is 18 feet above the floor which is covered with fine gray chipped stone.

Selection of mercury vapor for this installation was based on the work performed in the area. It was necessary that all surfaces in the interior have low reflectance factors to assure comfortable seeing conditions while the welders are working. To meet this condition of low interior reflectance factors, the efficient light intensity of mercury vapor lamps in high bay mounting was the obvious answer in view of the high lighting intensities required in the area.

A total of 14 Westinghouse High Bay Millite units, each equipped with one 400-watt EH1 mercury vapor lamp, are spaced across the area on 18-foot mounting heights. The units are wired on 220-volt branch circuits, representing a connected load of 5.7 kw. The lighting result over the 4800 square feet of area is 80 footcandles. Reflectance factors of interior surfaces are very low: ceiling, 10%; walls, 5%; floor, 10%. The general illumination is more than adequate for reading blueprints at any working location, and shadows are reduced to a minimum for layout work.

Sale of this installation was initiated by the contractor who was called in by the customer. Contractor Maniscalco had previously done power work for the customer. Sales assistance was rendered by the local utility. The contractor, however, actually wrapped the job up by showing the customer similar installations in other plants.

MERCURY LIGHTING provides an 80-footcandle lighting intensity in spite of low reflectance factors of all of the surfaces in the layout department at Norris Iron and Wire Works, Bridgeport, Pa.



LAYOUT DEPARTMENT, occupying all of a new section of Norris Iron and Wire Works, utilizes 400-watt EH1 mercury vapor lamps on spacings shown.

LIGHTING COMPETITION ENTRIES REVEAL HOW . . .

Electrical Contractors Promote and Sell Lighting

TODAY'S lighting market potential is the greatest in the history of the electrical industry. It ranges from factories to firesides, from schools to stores, from commercial buildings to churches, clubs, cocktail lounges, theatres and restaurants, and from streets and highways to sports and recreation. More and better lighting is wanted by everyone for its many benefits—at home, at work, and at play.

Producers of lighting equipment, electrical energy, and electrical power distribution products and materials are all looking for expanded markets. In order to maintain their own normal growth and keep their employees at work, they must increase their business—sell more of the products they make. The potential lighting market provides a logical solution.

The potential customers for more and better lighting, and for its many and diverse benefits, must be sold. These customers can, and will be sold. Many will buy new lighting systems of their own volition—*demand* new lighting incorporating better quality, improved seeing conditions, and greater flexibility and economy using new lighting techniques now available. But other thousands of potential customers must be sold. And sold they will be, because the opportunity is here, the time is right, and the rewards are too great to be passed up. Too many people have a stake in this market potential not to capitalize on it, especially when it provides a solution to their increasing need for an expanded market.

But who is to do this job? Who can promote and sell the virtually untapped potential lighting market effectively and economically? The logical answer is naturally that segment of the electrical industry that has the greatest reward at stake. That segment is the electrical contractor group.

Electrical contractors can and do promote and sell outstanding lighting systems. They do it more effectively and more economically, because they are already set up in business at the point of sale. By virtue of their position in the normal chain of distribution of electrical products, they are now daily in contact with the thousands of potential lighting customers who need and want better lighting.

Electrical contractors have a big stake in the relighting market, as well as in the lighting of new structures. They not only get the order for the lighting equipment on each lighting installation they sell, but also the order for the wiring materials, and for the installation and all the labor that goes with each complete installation. In many cases the wiring and labor equals or exceeds the dollar volume of the lighting equipment involved. This market is too big and too important to be ignored by contractors, and it is not being ignored.

Electrical contractors are already doing a good job in the promotion and sale of modern lighting. They will continue to do a good job, and will meet this present challenge as they have met others. How they promote and sell lighting to potential customers is revealed for the first time on a nationwide scale, in the entries submitted recently in the National Lighting Competition for Electrical Contractors.

All Competition entries have been studied, and information provided in them has been tabulated. It is believed this information will be useful to the entire lighting industry, and especially to electrical contractors. It is hoped that study of this information may provide the basis for more effective promotion of lighting sales. It is based on all entries submitted in the contest.

Competition Summary

The official Competition Rules restricted participation to electrical contractors and their full-time employees. They further provided that the sale of lighting installations entered in the contest must be initiated by the contestant, or some other member of his firm.

Entries submitted were classified in six different lighting classifications. They were divided among these six classifications as follows:

Store lighting	25%
Office and school lighting	27%
Industrial lighting	7%
Residential lighting	7%
Floodlighting	13%
Miscellaneous lighting (Churches, banks, restaurants, etc.)	21%

In the "office and school" lighting classification, all entries were on office lighting.

Of the total number of entries submitted and judged, 54% covered lighting installations that were "relighting" jobs, and 46% covered "new" lighting installations. In the "new" lighting classification were many installations such as the floodlighting of an old building, for example, where no lighting existed previously.

In 93% of the entries, the electrical contractors purchased the lighting equipment and related wiring and installation materials from electrical wholesalers. On the other 7%, special custom-designed lighting equipment was used, which was purchased direct from the manufacturers.

The types of lighting systems involved, based on the type used predominantly, were divided among the entries as follows: luminous ceilings—8%; recessed continuous row fluorescent—17%; recessed individual units (fluorescent and incandescent)—21%; exposed (surface or suspended) continuous row fluorescent—25%; exposed (surface or suspended) individual units—17%; and miscellaneous (valances, coves, and special)—12%.

The types of light sources used were divided among the entries as follows: incandescent—22%; fluorescent—43%; combination fluorescent and incandescent—35%. One installation used mercury vapor lamps.

In all of the above breakdowns, it should be noted that "percent of entries" is used, and not "percent of equipment".

FIVE LIGHTING AUTHORITIES judged the Entries in the National Lighting Competition for Electrical Contractors. They are (l. to r.): Jos. S. Schuchert, Richard Kelly, Willard W. Thompson, Everett M. Strong, and Carl W. Zersen, Chairman.

Contestants listed 56 different manufacturers as producers of the lighting equipment used. One contestant named 12 different manufacturers' products as being used in the lighting installation covered by his entry, and about half of the contestants listed two or more manufacturers' products as being used in the jobs covered by their entries.

How Jobs Were Initiated

Contestants named five different ways in which the lighting jobs were initiated. These methods of job initiation were divided among entries as follows: through personal visit and direct contact with prospect—28%; called in by old (previous) customer —25%; called in by new customers, on recommendation of old customers and others—20%; recommended by architect, engineer, or general contractor —11%; recommended by local power company representative or lighting engineer—5%; did not state—11%.

It is important to note that electrical contractors obtain nearly half their lighting jobs, based on these case histories, from satisfied customers for whom they have done electrical work previously. Add to this the architects, engineers, general contractors, local power companies and others who recommend them because of satisfactory work done on previous jobs, and it proves the premise stated previously that "electrical contractors are daily in contact with the thousands of potential lighting customers", and can promote and sell lighting more economically than any other group.

Sales and Engineering Aid

Many electrical contractors are staffed to do their own sales and engineering, while others use sales or engineering assistance offered by product suppliers or the local electric power company. In 31% of the Competition entries, the contestants received no sales or engineering aid. Of the remaining 69% who did receive aid, 89% (61% of total entries) received engineering aid, 65% (45% of total entries) received sales assistance, and 54% (37% of total entries) received both sales assistance and engineering help.

Of those contestants who received sales assistance (45% of the entries), lighting equipment manufacturers provided 27%, local power companies provided 60%, and electrical distributors provided 23%. Some contestants received sales assistance from more than one group, which accounts for the 110% total.

Of those contestants who received engineering assistance (61% of the entries), lighting equipment manufacturers provided 27%, local power companies provided 71%, electrical wholesalers 5%, and architects and engineers provided 7%. Some contestants also received engineering assistance from more than one group, which accounts for this 110%.

Electrical contractors from 19 states and one foreign country officially entered the Competition. Entry application forms were requested direct by 40% of the contestants. Electrical power company lighting engineers, working with contractors locally, promoted 28% of the entries. Equipment manufacturers' representatives were responsible for 10% of the entries.

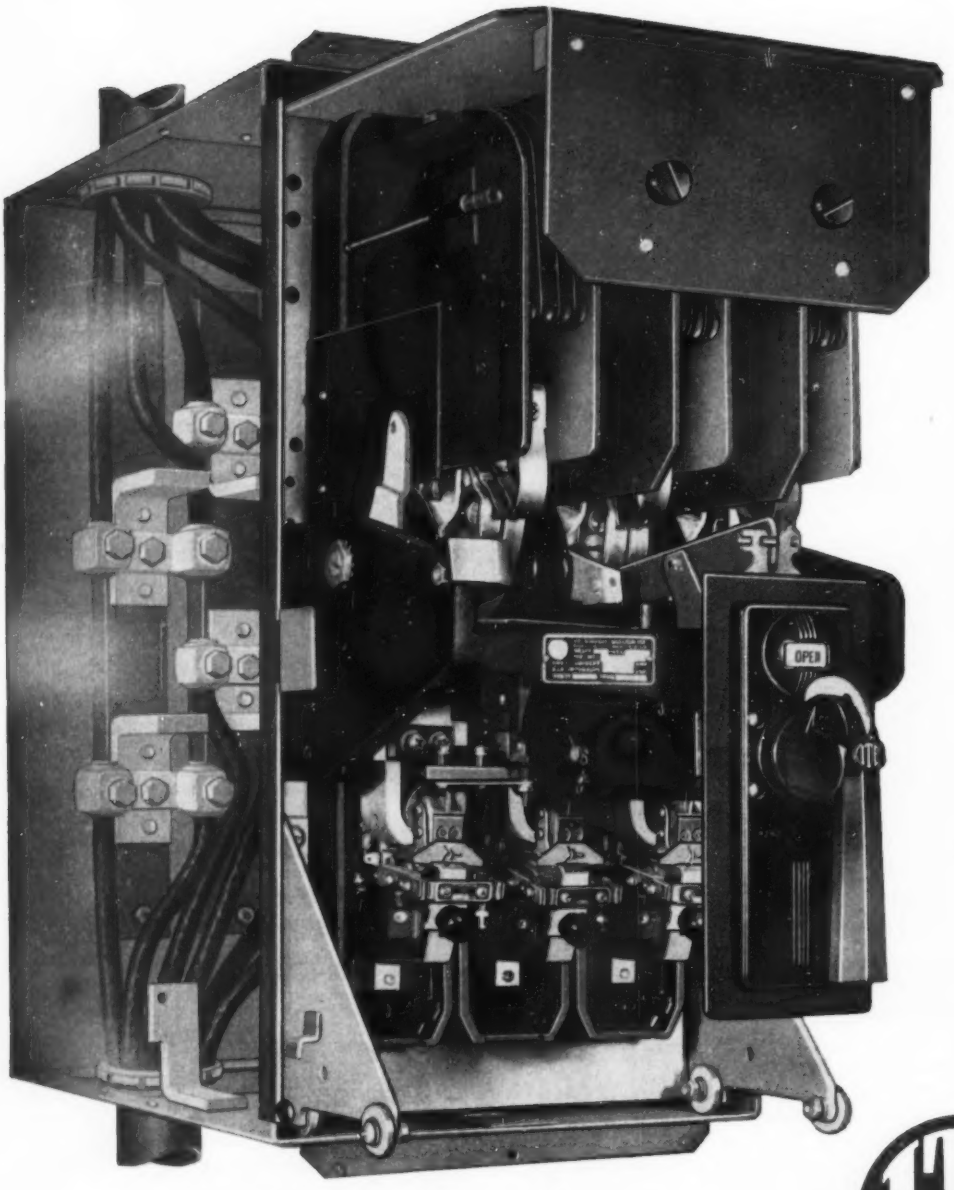
Prizes were awarded to contestants in eleven states. Of the 31 total awards, 18 cash prizes and 13 honorable mention awards, one contestant won one second prize and three honorable mention awards for the top record of awards to one contestant. This contestant had nine lighting installations officially entered in the contest, all outstanding lighting jobs. Another contestant, with only two lighting installations entered, copped two first prizes.

Over 15,000 entry application forms and 9000 Rules folders were distributed for the Competition. Many of these were mailed direct to contractors who requested them by coupon, post card, letter or telephone. Others were requested by electrical leagues, electric power companies, lamp and lighting equipment manufacturers, electrical wholesalers and others.

The sponsors acknowledge with thanks and appreciation the large number of entries submitted in this Lighting Competition, the first it has ever sponsored. They are also grateful to all those individuals in the lighting industry who aided in its promotion, and assisted contestants in the preparation of their official entries.

One of the really tough jobs in connection with the competition was the judging of the entries. This turned out to be an all-day task for the five-man Board of Judges. The sponsors hereby pay tribute to them for the very excellent job they did, requiring stamina, patience and a thorough knowledge of the art and engineering skill that goes into lighting application work. The judges, all well-known authorities in the lighting industry, represent five different branches of the industry. They were: Carl W. Zersen, chairman of the judging, Managing Director, Chicago Lighting Institute, Chicago, Ill.; Richard Kelly, Lighting Consultant, New York, N. Y.; Everett M. Strong, Professor of Electrical Engineering, Cornell University, Ithaca, N. Y., and President of the Illuminating Engineering Society (1952-53); Jos. S. Schuchert, Commercial Sales Manager, Duquesne Light Company, Pittsburgh, Pa.; and Willard W. Thompson, Consultant Electrical Engineer, Thompson Engineering Company, Boston, Mass.

I-T-E URELITE



KB Urelite extended from rear enclosure with cut-away section showing cable connection facilities.

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Safe, rugged Urelite construction is complemented by convenient operation and neat, modern design. Installation is simple too. Enclosures are designed to permit easy access for connection of terminals at rear of case.

Write for Bulletin 5107-D or ask your local I-T-E Distributor for details about high-quality I-T-E Urelites. They're available from 15 to 6,000 amperes.

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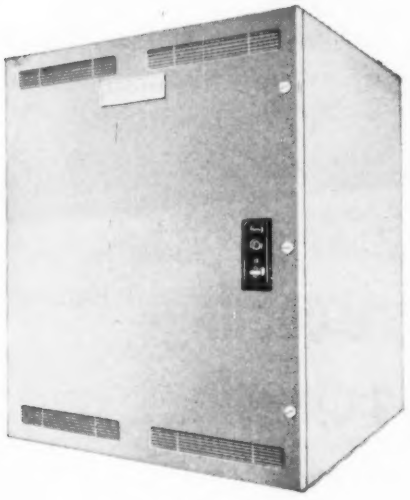

TYPE LG
75,000 and 100,000 amps. interrupting
2,000-6,000 amps. continuous
600 v. A-C; 250 v. D-C
2 and 3 pole

TYPE KC
50,000 amps. interrupting
100-1600 amps. continuous
600 v. A-C; 250 v. D-C
2, 3, and 4 pole

TYPE KB
25,000 amps. interrupting
35-600 amps. continuous
600 v. A-C; 250 v. D-C
2, 3, and 4 pole

TYPE KA
15,000 amps. interrupting
15-225 amps. continuous
600 v. A-C; 250 v. D-C
2, 3, and 4 pole

I-T-E Urelites are available in 4 types of enclosures:
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with auxiliary and tripping devices to fit specific applications.
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For 2, 3, or 4 lamps — 4′ or 8′ long.

more cooling
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Wide open on top and bottom
for brisk air-circulation

Cool lamps last longer.
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RESULT: greater efficiency
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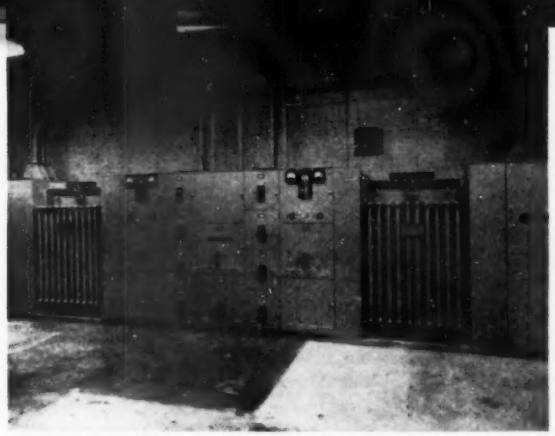


DOUBLE-ENDED LOAD CENTER includes two transformers and two sets of separate secondary feeder cubicles, with a normally-open tie breaker between the two units to permit all secondary breakers to be served by a single transformer.

THIS CENTRALIZED ARRANGEMENT of equipment includes (from right to left) an incoming line section with metal-clad air-circuit breakers and metering compartments, transformer, secondary switching breakers and centralized motor controls.

Modern trends and practices in . . .

Industrial Power Distribution—1

Maintenance of power continuity, reduction of installation and operating costs, protection of personnel and equipment, and efficient system planning can be materially aided by using load-center distribution, economical unit substations, proper circuit arrangements, higher distribution voltages, grounded neutral systems, interlocked armor cable, plug-in busways, rectifiers, capacitors, voltage regulation and relay switching.*

Industrial power distribution is the vital link that connects power source with power use. In fact, a modern power system constitutes low-cost insurance for the protection of a plant's total investment. As a rule, power distribution represents less than 5% of a plant's overall cost, yet it is the key to steady production, flexibility for changing needs, operational profits, general safety, and maintenance ease.

Since production stops when power stops, it is obvious that it pays to invest in the best electrical equipment obtainable. It is also wise to make systems simple, safe and flexible.

Simple systems are easy to understand, easy to install and operate during normal or emergency conditions and, as a result, are more reliable.

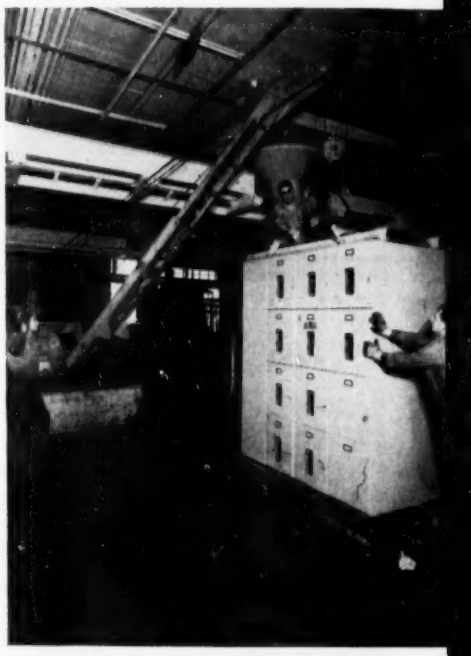
Safe systems are obtained by specifying metal-enclosures for all live conductors, using adequate circuit protective equipment, and designing systems so that maintenance work on energized equipment is not necessary.

Flexible systems are recommended to take care of any changes in process layout without having to make major changes in the distribution plan.

To obtain these benefits at reasonable cost—in new, expanding and modernizing plants alike—it is well to consider the advantages associated with such practices as load-center distribution, adequate interrupting capacity, proper circuit arrangement and high voltages for lighting.

LOAD CENTERS

Now widely recognized as the foundation for modern industrial power distribution is the use of small load-center substations wherein high-voltage incoming power (in the order of 2.4 to 13.8-kv) is stepped directly to utilization voltages (at 600 volts or less). By using these unit substations



FACTORY ASSEMBLED dead-front switchgear cubicles are ready for service as soon as they are set in place and connected to primary and secondary feeders. Available in a wide assortment of capacities and arrangements, substations are easy to order, ship, install and maintain.

* This timely review of distribution ideas is based upon the slide-film titled "The Vital Link"—the most recent in General Electric's "More Power to America" series.

Industrial Power Distribution—Part I

. . . Starts on page 125

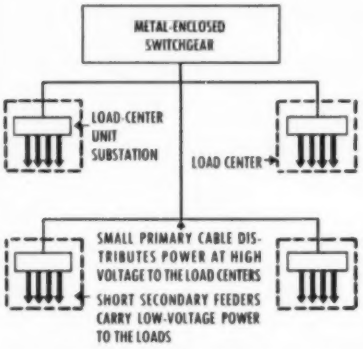
close to centers of power concentration, plus metal-enclosed factory-assembled draw-out primary switchgear, small primary feeders through the plant and short secondary low-voltage feeders from substations to individual loads, four objectives are achieved:

(1) Economies approximating 20% are realized by replacing heavy, long low-voltage feeders by fewer and smaller high-voltage lines. Also, savings in the cost of secondary switchgear far outweigh higher transformer charges.

(2) Since load-center installations merely entail the establishment of foundations, leveling and bolting equipment in place, then connecting leads, construction is both easy and fast, and engineering is at a minimum.

(3) Equipment may be ordered simply by referring to standard catalog numbers and specifications, and the resulting installation provides extreme flexibility in the event that units must be shifted at a later date due to plant rearrangement, or augmented to provide for subsequent plant expansion. Extra capacity need be added only as additional load develops, and substations may be installed at any location to fit any possible circuit arrangement. This permits the location of units indoors or out, in basements or on roofs, on factory floors or on balconies directly over the load centers.

(4) Because most secondary feeders are short in a load-center system, feeder voltage drop is low—rarely exceeding 2% or 3%. This is in marked contrast to the 12 to 20 percent drops frequently experienced in old single-substation installations where long low-voltage cables were installed between transformers and loads. With proper voltage throughout the plant, higher efficiencies are obtained due to the improved performance of motors, lighting units and heating devices.

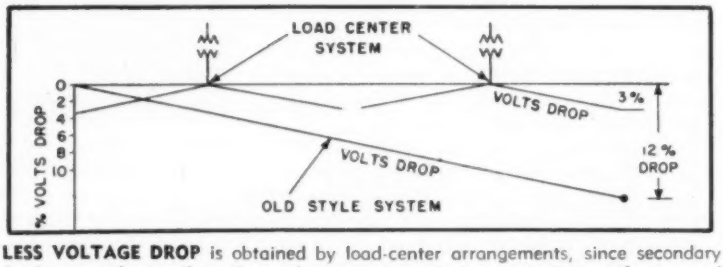


LOAD-CENTER DISTRIBUTION systems carry high-voltage power directly into a plant through metal-clad switchgear. Utilization voltage is distributed through short, inexpensive, secondary feeders.

ECONOMICAL SUBSTATIONS

Since several substations are used in a load-center system, the problem arises as to what size is most economical. The smaller they are, the more expensive they become per kva. Also, many small substations require more primary cables although they do reduce the lengths of secondary cables. On the other hand, if substations are too large, switchgear costs increase proportionately and considerably more secondary cable is called for. Typical curves, plotting standard kva ratings of load-center unit substations against relative overall costs per kva, show that unit substation sizes between 500 and 1500 kva are generally more economical to install and use, and rock-bottom economies may be obtained when ratings fall between 750 and 1000 kva.

While load-center subs are available in a variety of forms, all include an incoming line section, transformer, and low-voltage feeder section. The first of these sections may include circuit breakers, junction boxes or interrupted



LESS VOLTAGE DROP is obtained by load-center arrangements, since secondary feeders are shorter than those of a system employing a single transformer and many, long, low-voltage cable runs. Better voltage regulation means better motor, lighting and heating performance.

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FEATURE	PARAGON	MAKE "A"	MAKE "B"	MAKE "C"
Quick-change, easy-add dial trippers. No need to remove dial.	YES	YES	NO	YES
"Torsion-Clutch" Dial drive: permits manual check of switching.	YES	NO	YES	YES
"Quick-Out" movement: rattle-proof, positively fastened.	YES	NO	NO	NO
Motor operating indicator.	YES	YES	NO	NO
Double-Plate, long life movement.	YES	NO	YES	NO
Observation window in case cover.	YES	NO	NO	NO
Super-rigid case: 18 gauge or heavier.	YES	NO	YES	NO
U. L. approved for 30 amp switch capacity at 120 or 240 volts.	YES	NO	NO	YES

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THE SWITCH THAT REMEMBERS... AND LETS YOU FORGET

Industrial Power Distribution

. . . *Starts on page 125*

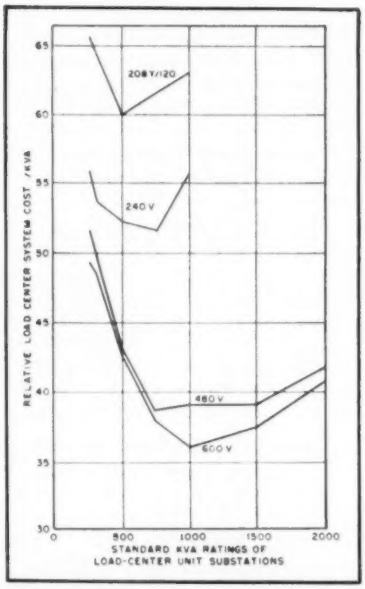
switches with or without power fuses, interlocked to prevent operation when the substation is under load.

Transformers may be oil filled, air-cooled dry-types, Pyranol or sealed dry-type units. All have advantages. For example; Pyranol-filled transformers combine high impulse strengths with low maintenance charges, may be used indoors or out, and involve no fire hazards. Dry-type transformers are lighter in weight than Pyranol units, although they do not have the same high impulse strength. Sealed dry types may be used in a variety of atmospheric conditions, whereas open air-cooled units should be limited to indoor, clean and dry locations.

Secondary switching sections now generally include draw-out type air circuit breakers for industrial applications, thereby providing a high order of protection, reliability and ease of maintenance. All parts are metal enclosed for maximum safety, and breakers may be electrically or manually operated.

CIRCUIT ARRANGEMENTS

The use of load-center substations makes many circuit arrangements possible, such as the radial, secondary



ECONOMICAL SIZES of unit substations vary slightly with wiring arrangements and utilization voltage level. In general, however, greatest savings can be made when units are between 500- and 1500-kva in size.

selective, primary selective, secondary network and the like. In theory, the more complicated circuits provide greater insurance against power disruption and, where power continuity is *imperative*, higher costs to install these systems are justified. However, it has been consistently proved that the reliability of *any* system depends not so much upon circuit arrangement as upon the selection, design, capacity, installation and maintenance of *good equipment*. For this reason the vast majority of plant engineers now favor purchasing the best equipment obtainable, then using either a radial system (due to its lower first cost, minimum amount of cable and adequate reliability for most industries) or a secondary selective system (doubling the reliability with only a slight increase in installation charges). Together these two arrangements account for over 90% of all load-center systems in use today.

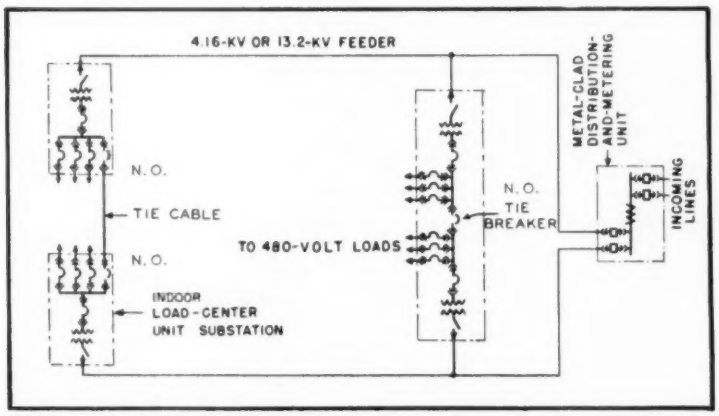
The radial system is most popular because there is only one primary feeder and one transformer through which a given secondary bus is served, and there is no duplication of equipment. If sufficient substation capacity is used to provide about 10-15 volt-amps per sq. ft. of floor area, experience has shown that it will adequately care for almost any diversity due to shifting of loads. This system appeals to plant engineers because it is safe, simple, easy to operate and expand by merely extending the high-voltage feeder or adding another one if necessary and installing more load-center substation units.

The secondary selective system provides slightly more flexibility and, in addition, makes it possible to take a feeder or transformer out of service without dropping loads for extended periods of time. It is a modified simple radial system with normally open tie breakers between pairs of substations or double-ended subs. In this way a minimum of additional equipment makes emergency power available at every important secondary bus. This system has been used in about every kind of manufacturing plant in the country and has met the exacting demands of critical processes in chemical plants, paper and steel mills, petroleum refineries, automotive assembly lines, drug manufacturing factories, and the like.

HIGHER VOLTAGES

The trend in recent years has been toward higher voltages, both for primary and secondary distribution. This may be traced to the facts that (1) the National Electrical Code now allows 15,000 volts to be carried inside buildings, and (2) major savings may be obtained by carrying these higher primary voltages through the plant to the load centers, then transforming them directly to utilization voltages at those points. Therefore, when utility voltage is below 15-kv, there is generally no reason for installing an intermediate substation between service entrance and load centers.

However, when utility supply voltage is above 15,000, transformation where the line enters the plant is generally necessary. Section 3204 of the Code states that "conductors operating at more than 15,000 volt between conductors shall be installed only in transformer vaults, substations and fire resistant motor rooms," making it necessary for all the incoming utility voltage to be reduced to that level before entering the building. This intermedi-



SECONDARY SELECTIVE SYSTEMS are constantly growing in favor, since they give greater reliability than radial systems, yet are only slightly more expensive to install. Cable is minimized, operation is not complicated and equipment is not unnecessarily duplicated.

Industrial Power Distribution—Part 1

. . . Starts on page 125

ate distribution step is usually 13,800 or 4160 volts. Studies have shown that 13.8-kv will provide greater flexibility at lower overall cost when plant demand is above 20,000-kva. Either 13,800- or 4160-volt primaries may be used economically when plant demand falls between 20,000- and 10,000-kva. And, when plant demand is below 10,000-kva, 4160-volt primaries are recommended.

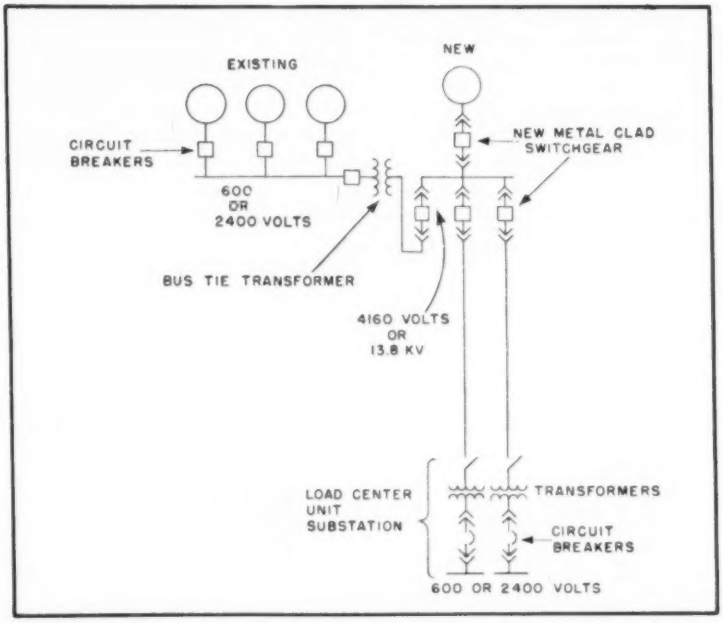
While some engineers also consider 2400 volts for primary distribution, there are two good arguments favoring a higher (4160 volt) selection. First; a 4160-volt system costs less to install since switchgear for given interrupting capacities are more economical, more kva can be carried in the feeders, fewer lines are required for a given load, and less copper is used for these cables. Then secondly; since the largest metal-clad circuit breakers made for 2400-volts have 150-mva maximum interrupting capacities while for 4160 volts the maximum is 250-mva, the use of the higher voltage will permit a much larger expansion program without having to install complicated synchronizing buses, current limiting reactors or other expensive means for reducing fault currents.

The advantages of higher voltages for secondary distribution are even more apparent, and it is now common practice to step current to 480-volts at load centers then, where necessary, use locally-placed lower-voltage dry-type transformers for 240-, 120-, etc. In those relatively few instances where more than half of the total connected load is at the 120-volt level, it would be more economical to use the plant-wide 208Y/120-volt secondary system. These cases, however, are not common in the industrial field and it may be said that, in general, a 480-volt secondary system will save up to 35% (compared with a 240-volt system) since there is less current to be carried, conductors can be smaller, there are smaller line losses and voltage drop is less.

GROUNDED NEUTRALS

With grounded neutral systems, operating and maintenance expenses are reduced because, should a ground fault occur, the faulty part is immediately isolated. With an ungrounded neutral system, ground detectors will show that a fault exists but will not show where it is. As a result, time and money must be spent to locate it.

Another advantage of a grounded neutral system is in improved service



EXISTING PLANTS may be expanded or modernized to take advantage of higher distribution voltage levels merely by installing a bus-tie transformer between the new and the old systems, thereby interconnecting the cable arrangements for maximum benefit.

reliability obtained through the elimination of multiple faults caused by undetected restriking grounds. Using a grounded-neutral system, the first such fault would be detected immediately.

Then there is the sound argument for greater safety, since the maximum voltage that can exist on any conductor of a grounded neutral system is only the normal line-to-neutral voltage. To illustrate, there could only be 277 volts to ground in the case of a grounded-neutral 480-volt system whereas, with an ungrounded system, the full line voltage, or 480 volts, could be present from any one phase to ground if either of the other two phases were to become accidentally grounded. This is important not only for reasons of safety, but also for economy's sake. High voltage isolated-neutral transformers must be insulated throughout to withstand the full line-to-line voltage and are therefore more expensive.

Still another advantage lies in better protection for system equipment. For example, on 2.4- and 13.8-kv systems, residual relays can be used to detect ground faults long before they develop into more destructive phase-to-phase or 3-phase faults.

When grounding, six rules should be followed:

1) Neutrals should be grounded at each voltage level.

2) Neutrals should be grounded at power sources only, not at points of utilization. However, at these utilization points, grounding should be provided for machine frames, cases and enclosures.

3) Avoid having parts of the system ungrounded.

4) Provide three short-circuit overcurrent devices for neutral-grounded systems: one in each phase, or one in each of two phases and one in the residual circuit.

5) In most industrial systems, two overload running relays are required for motor running protection.

6) In plant primary voltage systems having 2.4- to 13.8-kv, resistance grounding should be installed to reduce the burning effect in the event of ground faults.

Part II of this article will discuss the advantages of using interlocked armor cable, plug-in busways, mercury arc and metallic rectifiers for dc, capacitors for improving power factor, voltage controls and low-voltage relay switching applicable to industrial installations.

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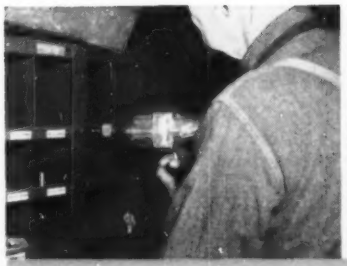

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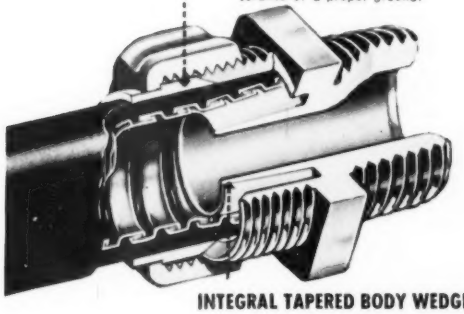

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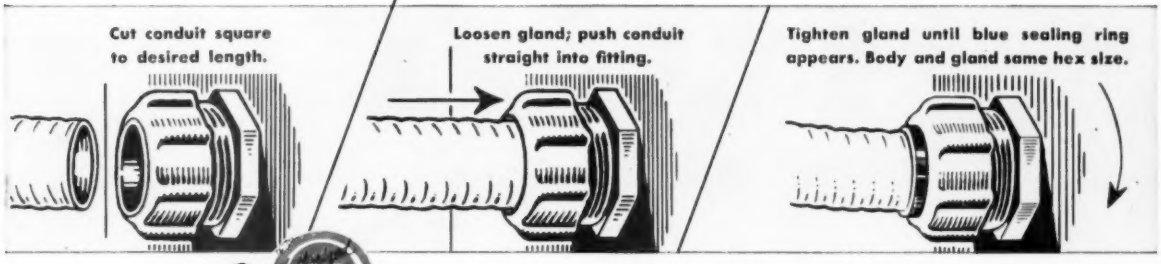

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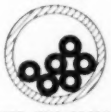

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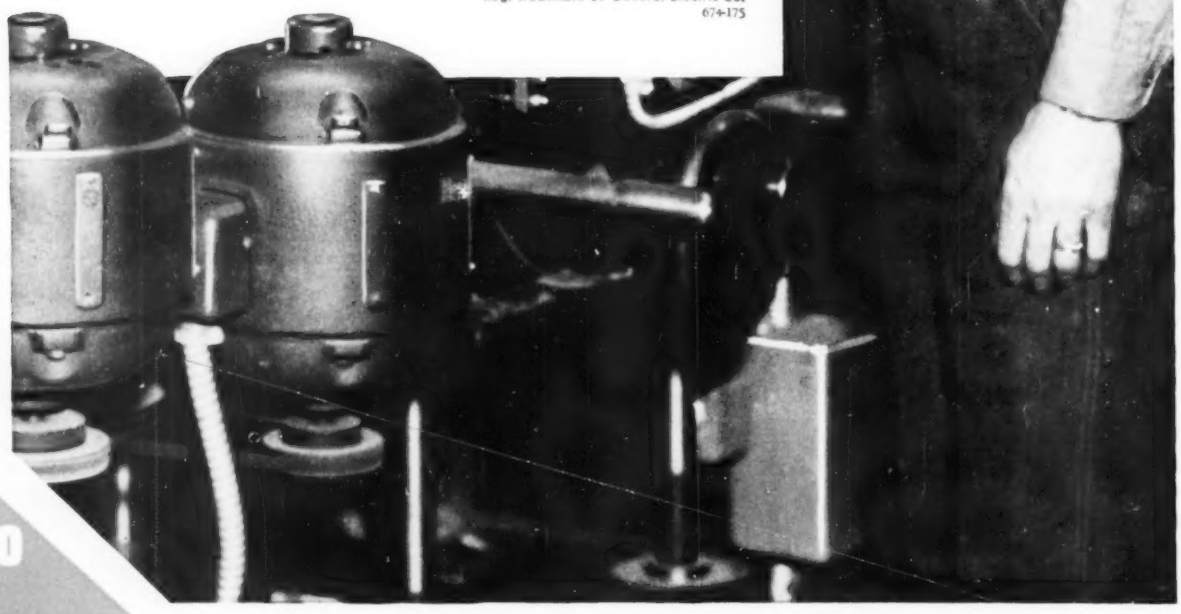

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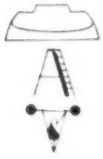
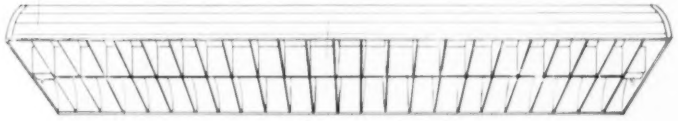
Save pupils' eyes. Save school-lighting dollars. The new MILLER LEXINGTON provides well-shielded overall illumination of high efficiency and low brightness at LOW OVERALL COST. Rigid Quality construction, with long-life finishes. Engineered for quick, easy installation. Low maintenance. Long, dependable life. Write for details.



DESIGN: *Functional—clean, simple lines.*

EASY *2-way lamping—1 ladder position.*

STRENGTH: *Rigid 1-piece steel louver.*



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LEADERS IN LIGHTING SINCE 1844

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Johnson City	425 W. Walnut St.
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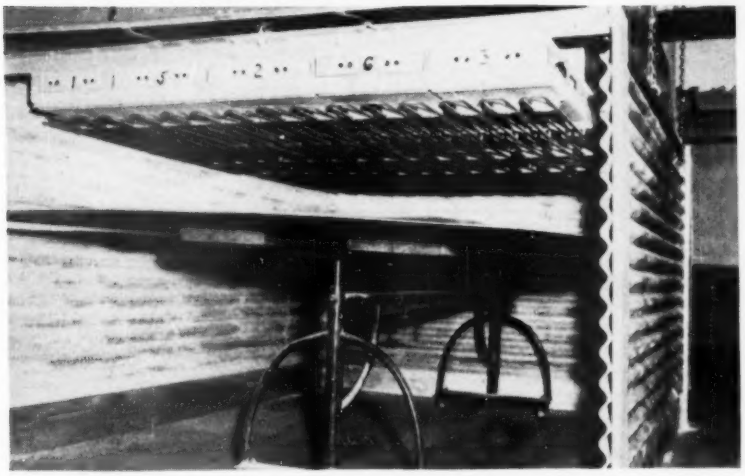
A DIVISION OF GENERAL ELECTRIC DISTRIBUTING CORPORATION

Practical Methods



FAR-INFRARED ELECTRIC PANELS with 108 kw. capacity form simple oven for heating 5-ft. by 8-ft. plastic sheets in plant of a plastics fabricator, reduces pre-heat time 55% over convection-heating method.

Simple Oven Uses Electric Radiant Panels

EQUIPMENT

The time required to pre-heat large Plexiglas sheets of plastic measuring 5-feet by 8-feet for forming and vacuum-molding has been reduced 55% by an Eastern plastics fabricator by substituting an electric radiant panel oven for a convection-heating oven used previously. The former fuel-fired oven required 18 minutes. But the new electric oven, using Chromalox electric panels, heats the transparent plastic sheets in eight minutes. These sheets are laid on an adjustable table, and readily absorb the intense, far-infrared radiation which is a long and almost invisible wave length that is absorbed by glass and transparent materials. The design of the radiant panels produces a uniform, overall heating pattern.

The installation was quickly and easily constructed on location at a fraction of the cost of a fuel-fired oven. Ten standard stock Chromalox panels were bolted to a simple metal framework, and closed on three sides with corrugated asbestos shields to restrict heat loss. The electric panels have integral insulation, and an interconnecting 100 ampere bus is built-in to simplify wiring.

With a capacity of 108-kw., two input controllers vary the radiant output to suit the gauge of work in progress. As plastic thicknesses range from one-sixteenth inch to one-fourth inch, demand is as little as 36 kilowatts. This amounts to a power cost of only a few cents per 40 sq. ft. section of the lighter grades. Customary spacing between the panel and the work is 12 inches, but can be varied by adjusting the legs of the portable work table to press height.

ELECTRIC WELDER units are rapidly becoming "must" equipment items in electrical contractor field shops; are used extensively for field fabrication of equipment supporting brackets and similar miscellaneous items. Here, mechanic adjusts a dc arc welder—one of two units—in an Emerson-Comstock Co., Inc., field shop on a large Chicago electrical construction project.

Earthworm Ram Speeds Underground Conduit Installation

CONSTRUCTION

When installing underground conduit runs, the California Electric Works of San Diego finds that an Earthworm ram makes it unnecessary to open an open trench for the entire extent of the run. When a run happens to be beneath a roadway or other similarly-used artery of traffic, this method of installation makes it unnecessary to disrupt traffic. The method has also been found useful in carrying wireways beneath building foundations or masonry walls. Since the drive unit is compact in size it can be placed in limited space and, since the thrust exerted is ample for most types of subsoil except rock and hardpan, there are few cases where its use is impossible. In the accompanying illustration, for example, the pipe is 1½-inches in diameter. The ground is adobe shale and the underground run measures 70 feet in length. In this instance, the installation was completed in 2½ hours, considerably less than would have been the case with open trench procedures.

DRIVING CONDUIT underground by means of an Earthworm ram eliminates necessity for open trenching and speeds installation of power circuits.

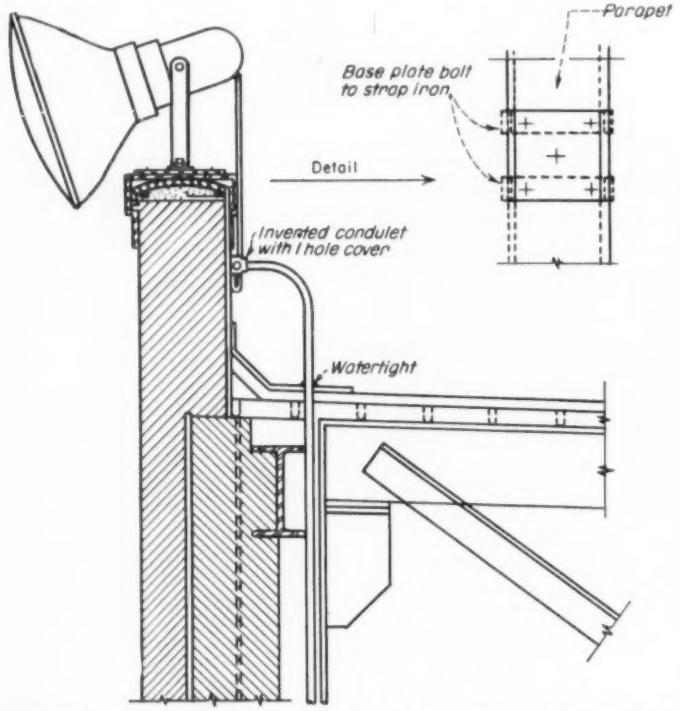
Equipment of this type is found to be particularly useful for installing new conduit runs for street lighting projects where frequent street crossings must be made. Breaking through the finished streets is costly and time consuming; tunneling leaves the street surface unmarred and traffic free.

Flood Light Bracket For Parapet Wall

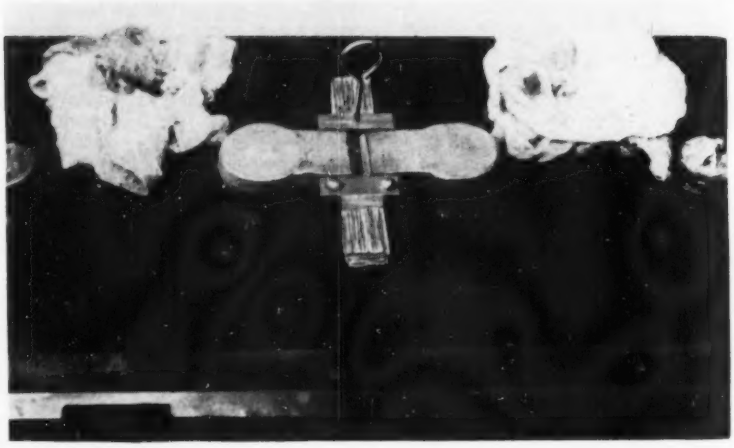
INSTALLATION

Parking areas, grounds and boundary lines surrounding the Pesco Products Division of the Borg-Warner Corporation in Bedford, Ohio, are illuminated by 750-watt wide-beam incandescent floodlighting units mounted along the roof parapet of the main building. However, since the top surface of the parapet is rounded, it was necessary to construct a special bracket to support the lights. This was accomplished by bolting the 8 8-by-¼-inch steel bedplates to 2-by-¼-inch straps. Straps were offset as indicated in the accompanying diagram and were secured to the inner and outer side of the parapet by bolts and expansion anchors.

Floodlight mounting yokes are, in turn, bolted to the steel bedplates, with elevation and direction of the light beams focussed as desired before bolts are finally set. Connections between floodlight housings and internal circuits are effected through flexible leads between lighting units and inverted condulets secured to the inner surface of the parapet beneath each lamp. Conduit extends from these condulets to the interior of the building, passing through watertight joints in the metal flashing which extends around the entire perifery of the roof.



MOUNTED ON THE COPING, floodlight unit is supported by yoke, bedplate and straps which are bent to clear the rounded top of the parapet, then bolted to the masonry sides. Lead-in incorporates inverted condulet with conduit.



CHAMFERED ENDS of the severed connector provide puddling space. Mold is held snugly in place by wooden wedges driven lightly beneath it. Moistened cloths prevent openings of battery and other adjacent parts from damage due to heat of welding process.

Mold Speeds Repair Of Truck Batteries

MAINTENANCE

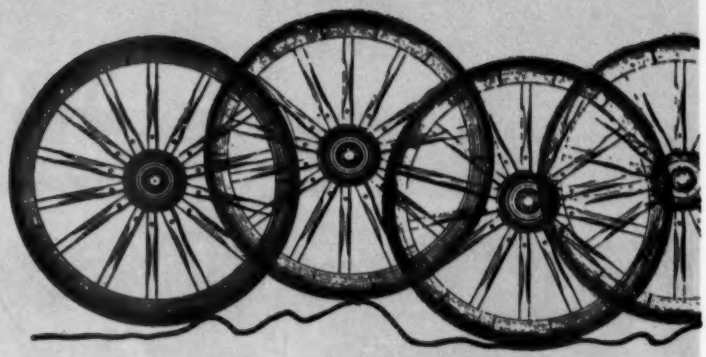
Many maintenance shops responsible for the repair of industrial truck batteries have found that it is possible to remove single cells, repair the damaged battery element, then replace the repaired cell in its rubber jar and weld the severed connections together again. By removing, repairing and replacing single cells like this, the life of a battery can be extended materially and the cost of replacements is reduced accordingly.

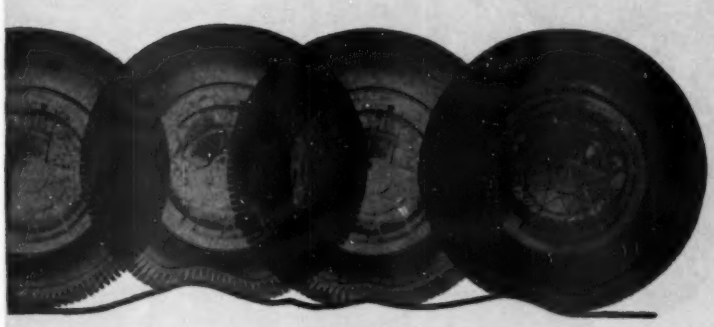
To aid maintenance men in obtaining sound, fast connections, Gould-National Batteries, Inc., of Trenton, N. J. has developed a simple mold by which severed inner-cell connectors can be re-spliced directly on the job, using the battery's own power for lead fusion.

The mold consists of a simple plate with two side blocks, one fixed, the other movable. This mold is placed beneath the two sawed ends of adjacent connectors and is supported firmly by small wooden wedges which are lightly driven between the mold and the battery case. The fixed side block is placed

SIMPLE STEEL MOLD slides beneath ends of sawed battery connectors, providing quickly-positioned bottom and sides for a lead weld to re-establish the battery circuit. The battery's own power is used in the fusion process.

The solid rubber tire on early cars and trucks was short-lived by modern standards. It didn't have the resilience to "roll with the punch", but took it on the chin from every rock and grain of sand in the road. Today's resilient super-balloon tire absorbs shocks and blows, "gives" under impact, and has a life measured in tens of thousands of miles.



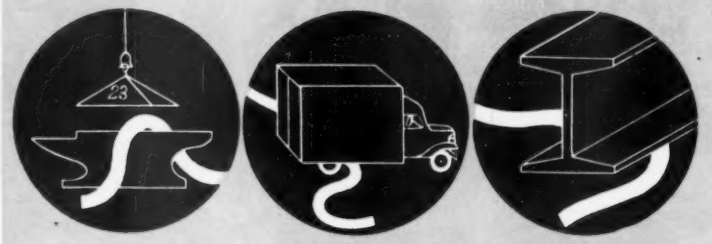


rolling with the punch

modern

BRONCO 60 *Certified*

is vulcanized by a unique and exclusive process which permits it to retain maximum resilience. It "rolls with the punch" like the modern super-balloon tire, "gives" without being punished under shock, impact, or crushing pressure. It wears many times as long as ordinary, highly-compressed portable cords and cables. The exclusive Bronco Synchro-Cure process results, too, in cords and cables with extra flexibility. The jacket does not constrict conductors and singles. Inner components are free to move slightly in relation to each other like the strands of a rope.



proven in the laboratory
10,280 blows with a 23 pound weight — the standard impact test — with no sign of failure. That's BRONCO's unsurpassed, unmatched record.

proven in use
Under-truck and underfoot, on construction jobs and in the factory BRONCO 60 Certified has proven its superior toughness and flexibility time and time again.

prove it on your job
Whatever rugged conditions are to be met with in your application, BRONCO 60 Certified will prove its toughness by lasting longer than any other portable cord or cable you have ever used.

BRONCO 60 CERTIFIED is manufactured by

Western Insulated Wire Co., Los Angeles 58, and sold nationally only through Electrical Wholesale Distributors.

DANGER SPOTS. Storms, floods, fires, collisions and accidents—beyond the control of ever-vigilant utility companies—can interrupt normal current supply. Darkness can be a serious menace to life and property.

Profits all around you

Exide WITH LIGHTGUARD

...YOU CAN CASH IN AS A DEALER

Think what this means! You can sell Exide Lightguard to factories, schools, hospitals . . . theatres, restaurants, hotels, office buildings . . . stores and markets, banks, police stations —and for many other applications. Some industrial plants need as many as 200 Exide Lightguard units! And remember, emergency lighting is now required by law in many Cities and States. It is also a vital factor in civil defense programs.

Exide Lightguard is self-contained . . . portable . . . easy to install. When normal power supply fails, the Lightguard turns on *automatically* and *instantaneously* . . . flooding vital areas with protective light. Your prospects realize the critical need for emergency lighting —they *want* the protection of Exide Lightguard. They know that sudden darkness—caused by accidental power failure—can result in personal injury, property damage, pilferage.

THE ELECTRIC STORAGE BATTERY COMPANY
Philadelphia 2
Exide Batteries of Canada, Limited, Toronto
"EXIDE" and "LIGHTGUARD" *Reg. T.M. U.S. Pat. Off.*

1888...DEPENDABLE BATTERIES FOR 65 YEARS...1953

TAKE THE FIRST STEP TOWARD BIGGER PROFITS!

Act fast. Get there first with Exide Lightguard. For complete details fill out and mail the coupon today.

EXIDE LIGHTGUARD

A portable, low cost unit that can be plugged into any A.C. lighting outlet. When normal supply of current fails, a built-in relay instantly and automatically turns on the powerful floodlights. After normal service is restored, the relay shuts off floodlights and returns battery to charge. The Exide battery is always ready for immediate action.

ATTENTION, CONSULTING ENGINEERS

To meet specific requirements of fixed installations, Exide emergency light and power equipment is available to meet a wide range of conditions. Exide engineers will be glad to help with your problems.

SEND THIS COUPON NOW!

THE ELECTRIC STORAGE BATTERY COMPANY
Philadelphia 2, Pa.

Sure . . . I want to cash in on the Exide Lightguard. Rush details.

NAME .....

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CITY ..... STATE .....

My present business is: ☐ Electrical Contractor ☐ Consulting Engineer ☐ Architect ☐ Distributor ☐ Dealer ☐ Other .....

against one side of the connector bars, and the movable block is placed snugly against the opposite side.

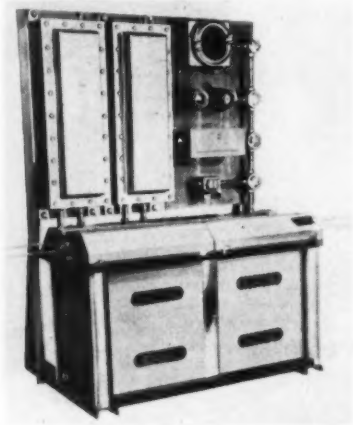
In order to provide puddling space, the two sawed ends of the connector are chamfered, then the tip of a carbon electrode is touched to that side of the connector which is in the electrical circuit and held in that position until it is cherry red. Lead is then added and the electrode is moved through the lead to build the weld.

Dust-Tight Housings In Hazardous Location

INDUSTRIAL

An important element in maintaining plant safety at the Lake City Arsenal of the Remington Arms Company, Independence, Missouri, is the use of dust-tight housings on the electrical assemblies of scales used in the presence of gunpowder.

The automatic check weighing scales used at the arsenal are manufactured by the Exact Weight Company, Columbus, Ohio. These machines weigh, classify and separate finished 20 millimeter ammunition at a rate of 100 rounds per minute. Inasmuch as each scale measures the weight of loaded cartridges, it must meet Class II requirements of the National Electrical Code for use in a hazardous dust location. To comply with the code, five different types of heavy aluminum Condulets protect the inner wiring, relays, tubes and switches of the measuring device against hazardous exposure to gunpowder dust. 20 bolts fasten down the lid of each tube and relay panel, completely sealing contacts and arcing points. Elsewhere, at junction boxes and other fittings, only rigid, threaded and dust-tight fittings are used.



DUST-TIGHT HOUSINGS and Condulet fittings on this weighing scale at a Remington Arms arsenal provide protection against gunpowder dust.

THE MAKERS OF THE WORLD-FAMOUS AMPROBE NOW BRING YOU THE

NEW AMPROBE JUNIOR

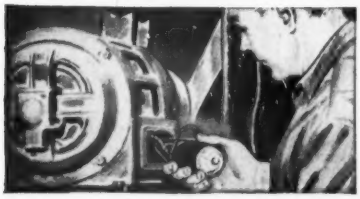
VOLT-AMP TESTER

ACTUAL SIZE

$19.85

INCLUDING VOLTAGE TEST LEADS

One pocket tester does the complete job



IT'S A SNAP-AROUND AMMETER

Measures current instantly without shutdowns or breaking of insulation for ammeter connections.

IT'S A VOLTAGE METER

Measures voltage quickly, accurately on a full-sized calibrated scale; eliminates guesswork.

Gives you tester ruggedness with instrument accuracy (within ± 3% of full scale)

PICK THE RANGE THAT FITS THE JOB:

MODEL "10": 0- 10 AMPS A-C 0-125/250 VOLTS A-C
MODEL "25": 0- 25 AMPS A-C 0-125/250 VOLTS A-C
MODEL "50": 0- 50 AMPS A-C 0-125/250 VOLTS A-C
MODEL "100": 0-100 AMPS A-C 0-125/250 VOLTS A-C

Now every electrical man can be equipped with a snap-around volt-ammeter. The Amprobe Junior is similar to the world-famous Amprobe, except that it is built to fit a specific job at low cost. For only a few dollars more than just a voltage tester, you get an *accurate* voltage meter *and* a prized snap-around ammeter. Pays for itself the first month alone by eliminating guesswork and time-wasting connections. Write today for Catalog No. 132. Pyramid Instrument Corp., Lynbrook, N. Y. (Export Div.: 458 Broadway, N. Y. 13. Cable: Morhanex).

IF YOUR JOB CALLS FOR A MULTI-RANGE AMPROBE:

AMPROBE "300"

0-6/15/30/60/150/300 AMPS AC.
0-150/300/600 VOLTS AC.
$49.50 COMPLETE WITH LEATHER CASE AND VOLTAGE TEST LEADS.

AMPROBE "600"

0-15/30/60/150/300/600 AMPS AC.
0-150/300/600 VOLTS AC.
$59.50 COMPLETE

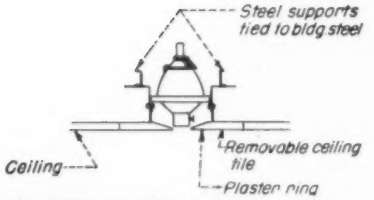
AMPROBE "1200"

0-15/60/150/300/600/1200 AMPS AC.
0-150/300/600 VOLTS AC.
$67.50 COMPLETE

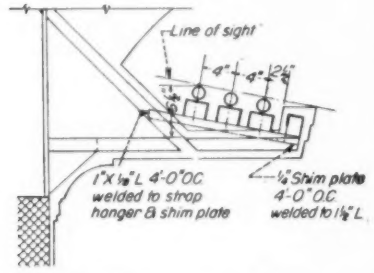

a step upward
in seeing comfort...
25% upward light insures a new high in comfortable seeing by eliminating sharp ceiling contrast or harsh shadows
As illuminating engineers know, it is not TOO MUCH LIGHT which causes seeing discomfort. Often the cause is TOO MUCH CONTRAST... distracting contrast between unlighted ceilings and light walls. UPWARD LIGHT is one important way to solve this "brightness-ratio" or extreme contrast problem!
It took a radical departure from run-of-the-mill fixture design to take maximum advantage of the upward light principle. The result is "Task-Master"—featuring sensationally increased 25% upward light for greater seeing comfort combined with 35° lamp shielding for better protection against glare!
The success of "Task-Master" is due to bold engineering initiative which devotes the entire length of the unit to the prime purpose of delivering MORE UPWARD LIGHT and FINER QUALITY LIGHT, unhampered by ballasts, wiring or other obstructions. All control equipment is centralized in the ends where it cannot interfere with upward light... all wiring runs through a unique "spine" support which also serves as lamp shield. Truly, a step UPWARD in seeing comfort.
BENJAMIN
Task-Master
of fluorescent industrial lighting equipment
Sold exclusively through electrical distributors
a step forward
in easier installation
and maintenance...
new detachable reflectors
cut maintenance manhours!
exclusive "Springlox"
lampholders speed re-lamping!
One of the many precedent-shattering "Task-Master" features is the detachable-reflector arrangement pictured here. Hinged, to facilitate easier, more thorough cleaning right on the fixture, or quickly unhinged and replaced with previously-cleaned reflectors, this unique system saves many manhours while encouraging regular maintenance and better plant housekeeping.
Patented "Springlox" lampholders are standard equipment on all "Task-Master" Units. All-metal "life-time" construction and exclusive spring design have made "Springlox" famous for vibration-proof operation and "easy-in, easy-out" lamp servicing. Send for your FREE copy of Bulletin AD5906 for complete "Task-Master" details. Benjamin Electric Mfg. Co., Dept. H, Des Plaines, Ill.
78-310

Modern Lighting

Coves and Pinpoint Spots for Dining Room Variety



RECESSED PINPOINT SPOTLIGHTS deliver high-intensity sparkle to glassware and silver on the table. Access is through removable ceiling tiles while cutoff and light-spread is accomplished by means of plaster rings and lenses.



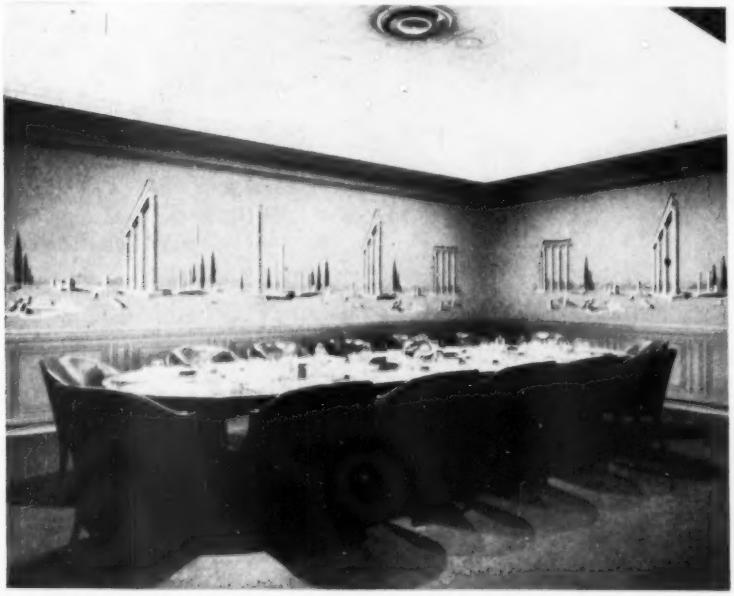
LAMPS ARE INCLINED to throw light outwards towards the center of the ceiling, while a deep lip along the front of the cove provides adequate cutoff. Support of coves is by means of channels and straps on 4-foot centers.

The attractive executive dining room in the office section of the new Hamilton Standard Propeller plant, Windsor Locks, Connecticut, is pleasingly illuminated by general light emanating from a continuous cove, and by accent light provided by recessed spots in the ceiling.

The cove is supported by a series of short horizontal channels and inclined strap hangers welded to the structural steel of the walls at 4-foot intervals to form cantilever bracing for the wire-and-plaster shielding. The lamps themselves are inclined so as to throw the light outwards towards the center of the acoustical tile ceiling, while a deep lip along the front edge of the cove provides the necessary cut-off to the normal line of sight. Lamps are deluxe warm white fluorescents mounted end-to-end in three rows spaced 4 inches apart, and each row is separately switched to permit the selection of various light levels.

Pinpoint spots are mounted above the centerline of the table, contain 100-watt incandescent lamps, and highlight the glassware and silver. These recessed fixtures are also tied to the building steel and are accessible through removable ceiling tiles. Plaster rings provide sharp cutoffs, while lenses in the units combine pinpoint apertures with table-covering spread-cones of illumination.

Wall-to-wall carpeting, leather upholstery, Corinthian murals and attractive panelling arrangements are utilized to promote the impressive and dignified decor of the room.



THREE-LEVEL ILLUMINATION is obtainable through separate switching of the triple bank of deluxe warm white fluorescent lamps housed in the perimeter cove of this executive dining room, while table highlighting is obtained by pinpoint spotlights recessed in the acoustical ceiling.

Relighting A Stockbroker's Office

High level, quality lighting was installed as part of the thorough modernization of the office area of Wayne Hummer Company, stockbrokers of Chicago, Ill. Throughout the 6500 square feet of office area, completely air conditioned and newly decorated, fluorescent troffers and surface mounted units provide a lighting result which complements the interior appearance and is well-suited to the visual tasks pursued.

In the customer area of the interior, continuous rows of surface mounted fluorescent units are mounted on the near white acoustic tile ceiling. An up-lighting component along each side of each row of fixtures eliminates any harsh contrast between the units and the ceiling. The fixture canopies are finished in matte buff to provide a brightness blend into the lighted part of the ceiling. In the working area of the interior, the same surface units are used in continuous rows, and troffer units are recessed in the section of acoustic tile ceiling which is mounted lower than the regular ceiling.

Each five-foot length of fixture contains two low brightness 40-watt, T-17, standard cool white fluorescent lamps. Each of the surface mounted fixtures on the 10-foot ceiling is equipped with cross-wise louvers, affording a 35 degree line-of-sight cutoff of the lamps from a lengthwise view. The reflector sides and the lengthwise center baffle on each fixture afford crosswise cutoff at 40 degrees above the horizontal.

The average lighting intensity in the office is 75 footcandles from a load of slightly over three watts per square foot, including ballast losses. Maximum footcandles are 85; minimum, 47. Wall brightnesses average 10 footlamberts, varying from 30 to about

CROUSE-HINDS EV Series

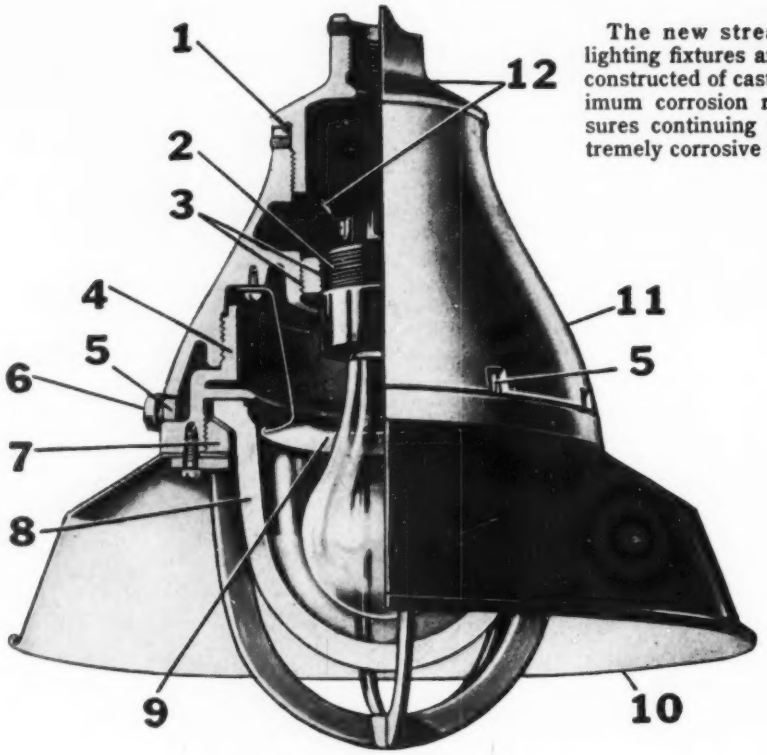
have been redesigned to give you:

EASIEST installation

EASIEST maintenance

HIGHEST efficiency

This adds up to big savings on every installation!

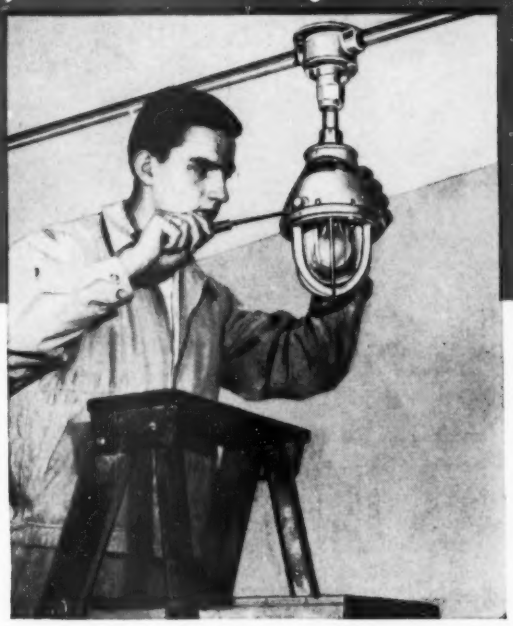


The new streamlined EV lighting fixtures are completely constructed of cast metal. Maximum corrosion resistance insures continuing safety in extremely corrosive locations.

1. Rubber O-ring gasket . . . seals joint against dirt or liquids.
2. New improved shock-absorbing receptacle has "universal" action . . . absorbs shock from *any* direction.
3. Threaded joints are flame tight . . . no sealing compound or external seals are required.
4. Lightweight one-piece assembly of globe, holder, guard and reflector is threaded high up inside of hood . . . no liquid or dirt can enter.
5. Notches in hood and globe holder . . . easy to loosen with a screwdriver.
6. Large knurled thumb screw . . . sets between notches for positive locking.
7. Globe retaining ring and cushioning gasket.
8. Heat and impact resisting globe. The accurately ground flange, essential for safety, is protected in a factory assembled joint . . . never exposed to damage.
9. Auxiliary reflector . . . etched Alzak aluminum . . . eliminates "trapped" light.
10. Porcelain enameled steel reflector.
11. Cast aluminum hood.
12. Cast aluminum body . . . has two openings for easier wiring from either side.

CONDULETS · AIRPORT LIGHTING

Explosion-Proof LIGHTING FIXTURES



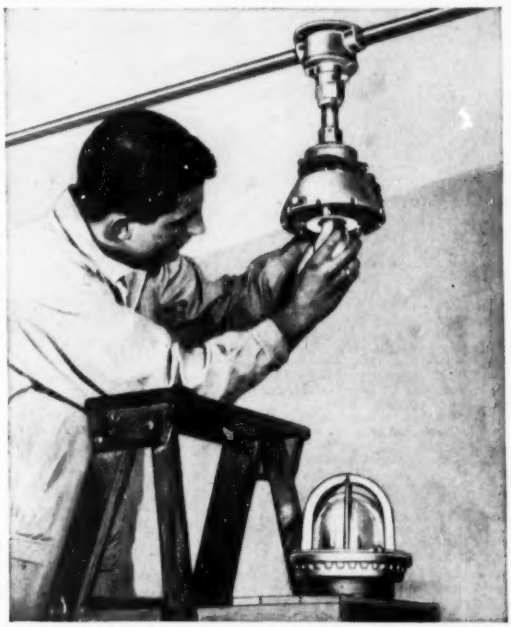
Easiest Relamping—3 Simple Steps

1. Single unit globe-holder assembly threaded into fixture hood is quickly removable for relamping. Slots are provided for prying with a screw-driver when necessary in corrosive atmospheres or other severe conditions. A large knurled thumb screw is easily loosened to unlock the globe and holder.

2. Globe and holder complete with guard (and reflector if used) is removed as an assembly. Only one lightweight piece to handle—globe retained in holder with flame-tight joint fully protected. Explosion-proof integrity assured. The 200/300-watt globe-holder assembly weighs but 8 lbs.

The new design of EV Explosion-Proof Lighting Fixtures is based on exhaustive studies and tests in Crouse-Hinds laboratories. The goal was to produce a fixture that would be easier to install and easier to relamp than any other explosion-proof fixture. Crouse-Hinds designers not only achieved this result but also created a fixture having the highest possible lighting efficiency.

You get 3-way savings when you install Crouse-Hinds EV Lighting Fixtures: quicker installation; quicker relamping; more light. This makes them the best buy for lighting in any location that is hazardous because of the possibility of the presence of flammable atmospheres. Use them on every job and have the best!



3. In relamping only a lamp is carried up and down the ladder and one assembly handled. It is not necessary to stock any spare parts or assemblies for complete convenience.

CROUSE-HINDS COMPANY
Syracuse 1, N.Y.

OFFICES: Birmingham — Boston — Buffalo — Chicago — Cincinnati — Cleveland — Dallas — Denver Detroit — Houston — Indianapolis — Kansas City — Los Angles — Milwaukee — Minneapolis New Orleans — New York — Philadelphia — Pittsburgh — Portland, Ore. — San Francisco — Seattle St. Louis — Tulsa — Washington. RESIDENT REPRESENTATIVES: Albany — Atlanta Baltimore — Charlotte — Corpus Christi — Richmond, Va. — Shreveport Crouse-Hinds Company of Canada, Ltd., Toronto, Ont.

TRAFFIC SIGNALS · FLOODLIGHTS

LOW BRIGHTNESS, high level, quality lighting was the key element in the complete modernization of the office of Wayne Hummer Co., Chicago stockbrokers. Average intensity is 75 footcandles, with load of 3 watts/sq. ft.

5 in the corners; ceiling brightness also averages 10 footlamberts. The louvers at 30 degrees viewing angle have a brightness of about 275 footlamberts. The brightness ratios of surfaces within the normal field of vision are low enough for comfort, but high enough to avoid monotony.

Circular-Louvered Fixtures Give General Store Lighting

The 70-thousand square-foot main floor of Gimbels New York City department store is illuminated to an average intensity of 27 footcandles by a series of circular Gotham fixtures surface-mounted on the 30-foot high ceiling on a center-to-center pattern of 11-by-12 feet. Each of these specially designed units contains eight 20-watt T-12 fluorescent lamps of the standard warm white color, plus a 300-watt filament lamp backed by a specular reflector. Fluorescent lamps are arranged around the perifery of the unit, and are shielded by radiating and curved louvers. In all, there is a total of 350 such units on this floor, representing a general lighting load slightly less than 4 watts per sq. ft.

In addition, coves, valances, case lights and illuminated signs are used to highlight merchandise, provide architectural interest, direct traffic and advertise sales events.

Reflectances of all surfaces are high, from ivory ceiling to marble floor.

SURFACE-MOUNTED UNITS combining eight 20-watt fluorescent lamps and one 300-watt filament bulb deliver average of 27 footcandles to sales counters in Gimbels New York department store. Lightmeter readings were taken after 14 months of service.

- MORE NON-CORROSIVE . . . 50% STRONGER!
- HIGHER CLAMPING PRESSURES!
- LOWER RESISTANCE . . . BETTER CONDUCTIVITY!
- LONGER LIFE . . . REUSABLE!
- DURABLE DURONZE . . . TROUBLE-FREE SERVICE!
- UNDERWRITERS' APPROVED from No. 12 AWG through 1,000 MCM!

ANDERSON XXXTRA-DUTY Split Bolt Connectors have been engineered and designed to give the absolute maximum in performance. They are made of Duronze, an alloy over 50% stronger than hard copper or commercial bronze commonly used in connector manufacture . . . and is more corrosion resistant than pure copper. You can depend on ANDERSON XXXTRA-DUTY Split Bolts to give longer trouble-free service under severest stress and load conditions. What's more, they may be *reused over and over again!*

Exhaustive tests, *many times more rugged than conditions of actual use*, show superior conductivity and durability over many simulated years . . . with no evidence of stress or corrosion cracking.

Wherever DEPENDABILITY is a *"must"*—
Wherever XXXTRA-DUTY *counts*—
SPECIFY ANDERSON QUALITY

ABW DESIGN MEANS QUALITY *plus* STRENGTH IN THE RIGHT PLACES!

ABW

Aluminum & Bronze **POWER CONNECTORS • CLAMPS • FITTINGS • ACCESSORIES**
for SUBSTATION • TRANSMISSION • DISTRIBUTION

ANDERSON BRASS WORKS, INC.

P. O. DRAWER 2151 • BIRMINGHAM 1, ALABAMA

Light's Jubilee Emblem Adopted by Committee

Light's Diamond Jubilee Committee has announced the adoption of an emblem for Light's Diamond Jubilee, the 1954 celebration of the 75th anniversary of Edison's invention of the first practical incandescent lamp.

Both past and future applications of electricity, being the theme of the Jubilee celebration, are symbolized on the face of the emblem by a representation of Edison's first lamp bulb held against the modern symbol of atomic power.

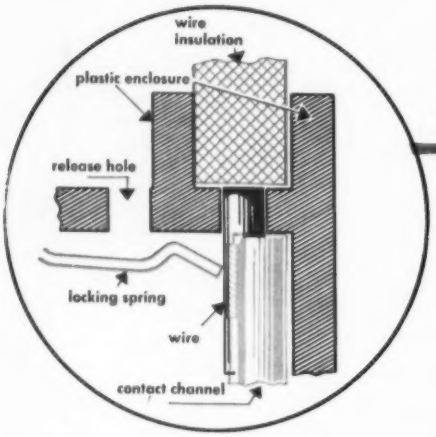
The Jubilee slogan, *Light for Freedom—Power for Progress*, epitomizing the role of electricity today, appears on the reverse side of the emblem, followed by the text *Commemorating Thomas A. Edison's Invention of the First Practical Incandescent Lamp October 21, 1879.*

The laurel branch on the reverse side represents achievements made possible by electricity since the October afternoon at Menlo Park when Edison and his small group of workers, after bending over a laboratory table for forty hours, saw the carbonized cotton thread filament of the crude experimental lamp finally burn out, bringing to a successful conclusion the hundreds of experiments that took place over a fourteen-month period at an expenditure of more than $40,000.

Light's Diamond Jubilee Committee, which is composed of representatives from all segments of the electrical industry, will coordinate industry-wide activities in the celebration of the Jubilee next year.

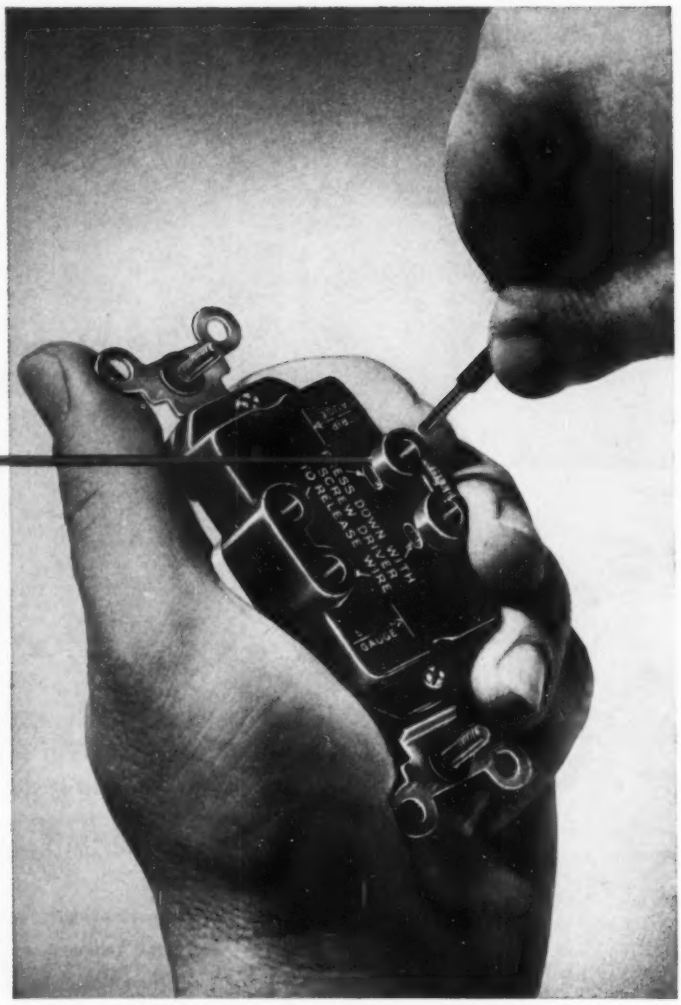
EMBLEM which has been adopted for 75th anniversary celebration of Edison's invention of the first practical incandescent lamp.

NOW... just push in the wires



New G-E "PRESSURE-LOCK" Terminals

connect wiring devices automatically — without binding screws



AUTOMATIC CONNECTIONS—Just push the stripped wires into the "Pressure-lock" terminals on the new GE3800-line wiring devices.

YOU CAN NOW make electrical connections by simply pushing straight, stripped wires into terminal holes. That's all you do—a hidden spring-lock automatically grips the wire and holds it securely against a contact channel. These "pressure-lock" terminals are featured in the new GE3800-line of wiring devices — outlets, switches, and lampholders. They will take any No. 14, 12 or 10 Awg solid conductor, or No. 14 or 12 stranded wire with equal ease. They are listed by Underwriters' Laboratories, Inc.

EASIER—no binding screws to loosen or tighten . . . no looping of wires . . . no hooking around terminals . . . no crimping. Wires can be released instantly by depressing the locking spring with a screwdriver.

SURER—wires are securely locked in place. A pull of 75 pounds won't loosen them. Neither will jarring or vibration. Constant pressure gives a positive contact against the channel.

SAFER—all live parts are completely enclosed to guard against shocks and shorts. There's no danger of loose connections.

For a copy of our folder on this revolutionary wiring method, write Section D78A-1018, Construction Materials Division, General Electric Company, Bridgeport 2, Conn.

You can put your confidence in—

GENERAL ELECTRIC

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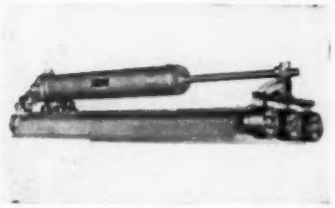
Product News



Fluoresecent Fixture (1)

A new explosion-proof and dust tight fluorescent lighting fixture for use wherever the presence of explosive gases or vapors or cumbustible dusts requires safe, practical lighting. Fixture may be spaced end-to-end with other fixtures of its same type, making possible continuous and uniform illumination along work areas. Each fluorescent tube is housed in an individual tube of heat-resisting glass. Tube ends are reversed tapered and sealed into aluminum housings which also contain lamp receptacles. Receptacle housings at ballast ends are pivotally connected to ballast housing. At relamping ends, receptacle housings are fastened to a supporting stem assembly which is attached to ceiling or structural building member. Type EVF fixture is available for straight pendant mounting but special fittings for 45-degrees mounting are also obtainable.

Crouse-Hinds Company, Syracuse 10, N. Y.

Safety Switch (2)

Special industry (NEMA XII) safety switch has been introduced to meet the needs of the machine tool and processing industries as well as the industrial plants requiring a switch enclosure which will exclude dust, dirt, oil and coolants. Box is formed and welded from heavy code gauge steel. Cover is sealed by a neoprene gasket, and is held closed by a latch and captive screws. A full cover and operating mechanism interlock is also a feature. Switches are now in production in 30, 60, 100 and 200 ampere ratings in either 240 volt ac/250 volt dc, and 600 volt ac/dc.

Square D Company, 6060 Rivard St., Detroit 11, Mich.

Terminal Blocks (3)

Lok-A-Blok enables users to build their own terminal blocks in various lengths and combinations up to 25 poles without waste. It consists of three parts which can be assembled without tools: (1) Red Lok-A-Bloks which house the solderless connectors, (2) the solderless connectors, and (3) a yellow Lok-Strip which holds assembly together and acts as an identification strip as well. Identifying numbers may be marked in pencil, ink or any other method on top. A hand tool can be supplied which reams necessary holes for mounting. On live metal parts Lok-A-Blok has a clearance "over surface" of ¾-in. and "thru air" of ½-in. Bulletin available.

Ilsco Copper Tube and Products, Inc., Mariemont Ave., Cincinnati 27, Ohio

Lighting Fivture (4)

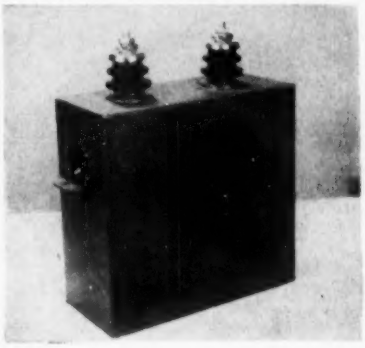
A new 16-inch diameter drum globe-type lighting fixture, Model No. 3438, allows builders and architects to give custom lighting benefits to both new and remodeled construction units, through the use of standard light fixtures. Glare spots are eliminated. Larger glass area of globe gives greater diffusion of light and dissipation of heat is enhanced by a greater volume of contained air in fixture. Globe is of opal glass. Ceiling holder is of safety-type, having a self-releasing, high tension spring latch that holds globe in place. Bowl may be taken down for cleaning.

Solar Lighting Manufacturing Co., 1357 South Jefferson St., Chicago 7, Ill.

Hermetic Seal (5)

Hexseal Series 3030 has been added to this line. Units are high-pressure hermetic seals for all standard push-button switches. When installed, boots replace switch locknuts on exterior of panel, and serve as both seal and locknut. Hermetic sealing is maintained by gasket rib, which seats firmly against panel to keep out moisture, dust, or combustible vapors. Made of silicone rubber, they are flexible from —80° to 500°F, and are unaffected by exposure to sun and weather.

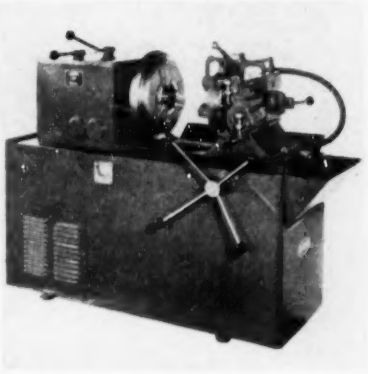
Automatic & Precision Manufacturing Co., 252 Hawthorne Ave., Yonkers 5, N. Y.



Capacitor (6)

A new 15-kvar, 210-volt capacitor for outdoor and indoor application. Available in three styles: 3-phase indoor, single-phase outdoor, and 3-phase outdoor. Unit is especially suited for outdoor use on secondary circuits and on secondary networks where it delivers 13.3 kvar at 216 volts. Where multiples of 15 kvar are needed for outdoor use on pole mountings, capacitors may be mounted in standard one-, two-, and four-unit brackets. Also available for indoor use in dust-tight and rack-type equipment. It weighs 76 lbs. and is 6-in. wide, 17½-in. high, and 17 in. long.

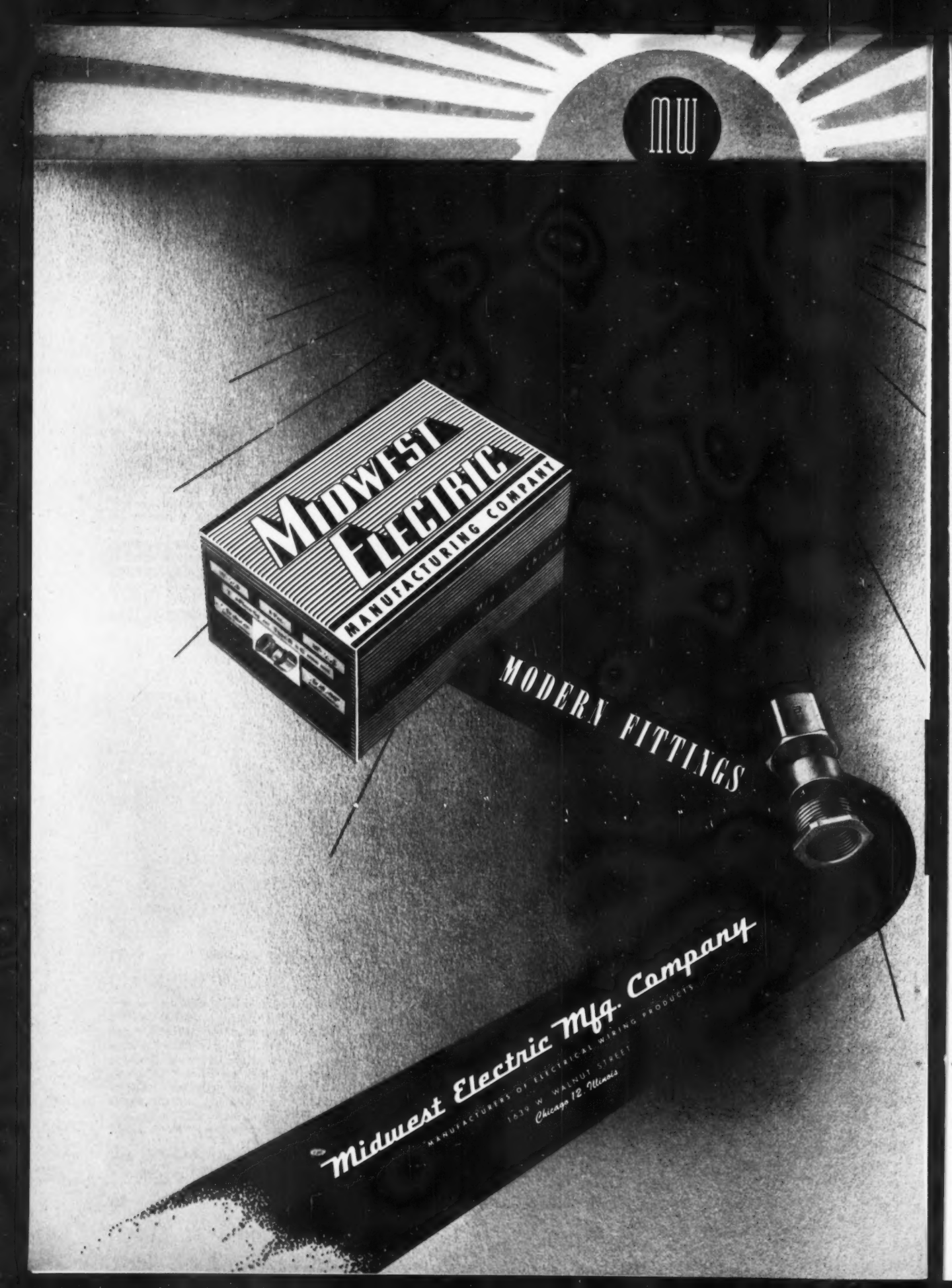
Westinghouse Electric Corp., P. O. Box 2099, Pittsburgh 30, Pa.



Threading Machine (7)

A new low cost, 4-inch pipe machine, known as No. 784 "Thrift Model". It is a heavy duty, fabricated steel constructed, floor type pipe machine, with a standard range of 1- to 4-in. and an extra range of ½- and ¾-in. It is equipped with a front chuck. Rear centering chuck is quick acting and non-binding. A magnetic starter with push-pull selector switch for run and jog, controls heavy duty, 1800 rpm, 3 hp, motor. It has four spindle speeds, controlled by levers. Booklet available.

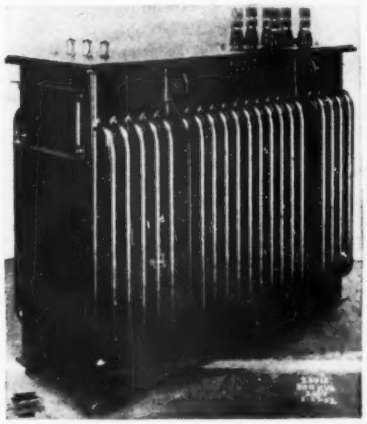
The Oster Manufacturing Co., 2057 East 61st Place, Cleveland 3, Ohio


MW
MIDWEST ELECTRIC
MANUFACTURING COMPANY
MODERN FITTINGS
Midwest Electric Mfg. Company
MANUFACTURERS OF ELECTRICAL WIRING PRODUCTS
1639 W. WALNUT STREET
Chicago 12, Illinois

Circuit Breaker (8)

New I-T-E "J" frame 225-ampere circuit breaker saves mounting space. It measures 9-in. wide by 11-in. in length and 5½-in. deep, including handle. Reduced size allows "double butt" mounting in convertible panelboards. Design features include enclosed terminals; external instantaneous trip adjustment provides 5 separate instantaneous trip-point settings; solderless pressure-type cable connectors; rear connection studs. It is a thermal-magnetic breaker with quick-made, quick-break operating mechanism. Common trip operation is retained; an overcurrent on any pole opens all poles simultaneously. Breaker is available in ratings from 70-225 amperes; 2- and 3-pole; 600 volt ac, 250 volt dc; 15,000 amperes interrupting. Approved by Underwriter Laboratories.

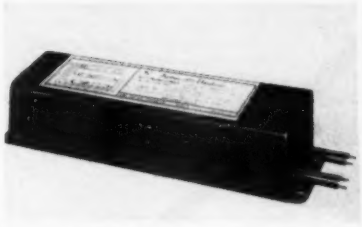
I-T-E Circuit Breaker Co., 19th and Hamilton Sts., Philadelphia 30, Pa.



Transformer Unit (9)

A new type of pre-assembled distribution transformer unit known as the Power Pac Assembly. It consists of a single tank containing standard distribution transformer core-and-coil assemblies. Assembly is designed for either single or multiple customer service with provisions made for metering. It can be supplied for either three phase service or a combination of three phase and single phase service, the latter being suitable for three phase power loads and single phase lighting loads. Power Pacs are available in 3 phase—150, 225 and 350 kva; and combination three phase/single phase with ratings of 100 kva and 200 kva. They can be installed in buildings or in sidewalk vaults. They can also be installed outdoors.

Pennsylvania Transformer Co., Canonsburg, Pa.

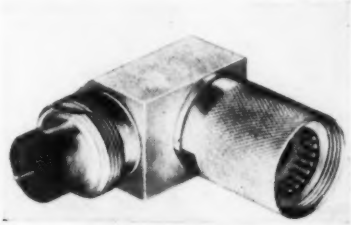


Lamp Ballast (10)

A new cold cathode lamp ballast, type CK-2812-11, is designed for use with two 93-inch cold cathode lamps with tube pressures of 6 mm. It automatically compensates for voltage variation; a voltage variation of plus or minus 10% of normal has no appreciable effect on secondary voltage. Size is 2⅜-in. high, 3⅛-in. wide and 11⅛-in. long. It weighs approximately 10 lbs.

Acme Electric Corp., Cuba, N. Y.

(11)

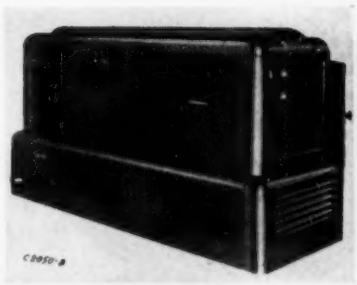


CONNECTOR No. B2897 is a right angle pulse type adapter to be used where space is limited. It mates with standard UG 182 A/U receptacle and a male panel mounted receptacle of the same series. Size is approximately 2-27/32-in. by 3¼-in. The part is designed for service with high voltage—5,000 volts peak at 50,000 feet altitude. Shell is made from brass, and has a tin plate finish. Manufactured by H. H. Buggie, Inc., 726 Stanton St., Toledo 4, Ohio.

Indicator (12)

A vertical scale electronic indicator, especially designed for applications where panel space is limited. It is 6½-in. wide and is expected to be widely used in the chemical, aircraft, central station, marine and petroleum industries. It has a rotating scale with fixed index. Scales are illuminated, with black numbers and division lines on a white drum. It incorporates the null-balance method of measurement. Heart of indicator is continuous balance unit, which amplifies millivolts up to necessary power needed to operate balancing motor. Bulletin No. 1541 available.

Minneapolis-Honeywell Regulator Co., Wayne & Windrim Ave., Philadelphia 44, Pa.



Electric Plants (13)

Two new gasoline-driven electric plants, rated at 10,000 and 15,000 watts have been added to this line. These new "HQ" models are powered by Continental 4-cylinder, water-cooled engines and were designed to provide electric power for both primary and standby applications. Some of the features are: An impulse-coupled magneto with special radio shielding; a sliding battery rack; a new cooling system of 10½ quarts; fuel consumption for both 10 kw and 15 kw under one quart per kilowatt hour at full rated load. A new generator features voltage regulation of plus or minus 2%. It is capable of starting motors on basis of 2,000 watts per hp and maintaining 80% of rated voltage with a load on motor. All generators are direct-connected to engine by a semi-flexible drive disc. Available in all standard voltages, frequencies and phases. Both units offered in housed and unhoused models.

D. W. Onan & Sons, Inc., Minneapolis, Minn.

Autotransformer (14)

Type 300BU Adjust-A-Volt variable autotransformer features a new design brush assembly. Pre-adjusted at factory, brush assembly maintains almost constant pressure from full-brush to no-brush. A direct electrical connection between brush and current take-off point of brush assembly is also featured. It is small and compact, making it ideal for built-in applications such as line voltage control for power supplies and instruments, control of heat in ovens, motor speeds, etc. Suitable for clock-wise or counter-clockwise rotation and over-voltage (0-135 volt) or line voltage (0-115 volt) operation. Maximum load rating 0.4 kva available in single or ganged assemblies.

Standard Electrical Products Co., 2240 E. Third St., Dayton, Ohio

FHP Motor (15)

A new fractional-horsepower motor for high- and low-pressure oil burners. It features reversible rotation in $\frac{1}{4}$ and $\frac{1}{6}$ hp ratings. Rotation can be changed by switching connections in terminal box on pulley-end flange face. New motors have same flange mounting as previous models. Other features include increased lubrication life, black enamel finish and insulation designed to resist moist atmosphere.

General Electric Co., Schenectady 5, N. Y.

Ballast (16)

A new "CW" (constant wattage) ballast for use with EH-1 mercury vapor lamps. Designed for application on 115- or 230-volt circuits. It is a regulated, static-type ballast. With its improved open-circuit characteristics, ballast ensures lamp starts under adverse temperature and line voltage conditions. It draws a low primary current and has a maximum temperature rise of 38°C during open circuit.

Line Material Company, 700 W. Michigan St., Milwaukee 1, Wis.

Tubing (17)

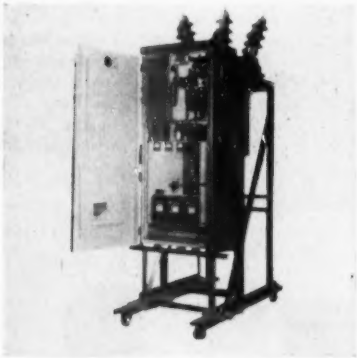
Xduct Junior is an electrical metallic tubing with a new outside surface having unusual resistance to corrosion and a new inside surface presenting minimum resistance for wire pulling. A new electro-

galvanizing process assures uniform, unbroken zinc coating over exterior of tubing. This zinc coating assures corrosion protection. The inner surface has a complete covering of a newly developed aluminum enamel. This finish assures minimum friction when fishing wires and cables through electrical metallic tubing. Available in 10 ft. lengths of standard diameter sizes ranging from ½ through 2 inches. Connectors and couplings matching new tubing also available. Tubing and fittings approved by Underwriters'

National Electric Products Corporation, Gateway Center, Pittsburgh, Pa.

(18)

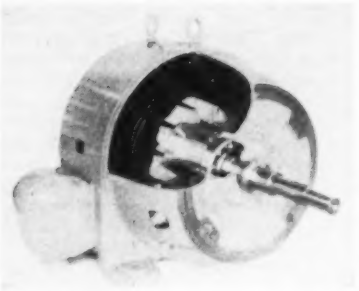
LIGHTING FIXTURES for marking entrance and exit roads. Fixture may be mounted either to 4-inch wood posts or to 2-inch pipe. Lamp is shielded by steel reflector, finished outside in greenstone Ultranamel, inside is high gloss white reflective finish. Bulletin No. 136-53 available. Made by Steber Manufacturing Co., Broadview, Ill.



Circuit Breaker **(19)**

A new 3-phase oil circuit breaker (Type G) for 14.4 and 23 kv distribution service. It utilizes a single oil tank to contain all three circuit breaker poles, replacing former three-tank arrangement. To inspect or service breaker, all three poles are exposed simultaneously by lowering a control. Operating solenoid, control relays, terminal blocks and rectifier, when required for ac control, are mounted on back of housing. Continuous current ratings available up to 1200 amperes with 8-cycle arc interruption up to 250 mva.

Westinghouse Electric Corp., Box 2099, Pittsburgh 30, Pa.



Pump Motors (20)

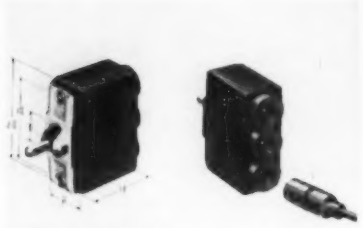
Close-coupled pump motors are now available as high as 60 hp. Designed specifically for use with centrifugal pumps, this motor, type SCB, eliminates shaft alignment or pump mounting problems by supporting pump on its NEMA style "C" registered mounting bracket. A step shaft, with special diameter, shoulder and tapped hole for mounting impeller, has all ground diameters for precision assembly and sealing against leakage. Grease lubricated ball bearings permit vertical, horizontal or any intermediate angle installation. A solid, closed flange on style "C" adapter bracket prevents entrance of pumped liquid into motor.

U. S. Electrical Motors, Inc., Box 2058, Terminal Annex, Los Angeles, 54, Calif.

Controls (21)

A new line of photo-electric controls utilizing TT-1 cold cathode tube design. There is no warm up time needed and stand-by current is nil. A precision lens system is used as well as a vernier focusing adjustment. This allows for the utilization of apparatus for either distant operation employing a parallel light beam or for short pin point operations employing a sharply focused light beam. Lens position can be locked at any setting; and by employing a lens in both light source and photo-electric tube housing.

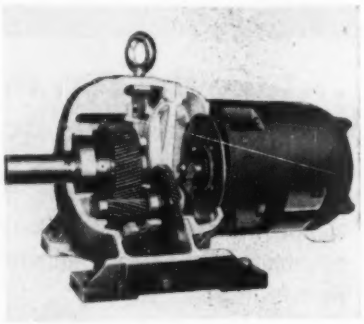
Haledy Electronics Company, 57 Williams St., New York 5, N. Y.



Toggle Switches (22)

Two new series of waterproof toggle switches, designated Type ACM, have been added to this line. They feature a molded in female waterproof connector receptacle, designed for assembly with male waterproof plugs. Both types are compact, and are encased in a specially developed molded rubber compound. All metal parts are plated for corrosion resistance. They operate —65°F to 160°F, and withstand shock and vibration. Series "29-ACM" is a flush mounting switch, with capacities on resistance type load of 25 amperes at 24 volts dc and 15 amperes at 125 volts ac. Series "19-ACM" is one-hole mounted, with a specially designed waterproof barrel. Capacity on resistance type load is 25 amperes at 24 volts dc and 11 amperes at 125 volts ac. Each switch is available either SPST or SPDT, in eight different toggle arrangements. Literature available.

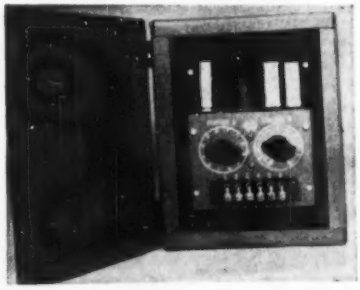
Riverside Manufacturing and Electrical Supply Company, 10228 Michigan Ave., Dearborn, Mich.



Gearmotors (23)

New integral gearmotor series from 1 to 15 hp is available. Motors are offered in a wide range of speeds, in single, double and triple gear reductions. In the gearmotors, gears meeting A.G.M.A. Class I, II and III specifications can be had to fit varying load requirements. Motors are available with constant or variable speeds and with protective frames to operate under most atmospheric conditions. Bulletin available.

Century Electric Co., 1806 Pine St., St. Louis 3, Mo.



Electronic Timer (24)

A new enclosed electronic timer for programming automatic industrial and laboratory processes. The type 60 MC timer was designed to provide operation by foot switch, pushbutton, pressure switch or any other momentary or sustained contact closing device. It may be operated from any 105-125 volt, 60-60 cycle line and consumes 8 watts. Time intervals provided range from $\frac{1}{6}$ second to 60 seconds. Its single pole, double throw relay has 10 ampere contacts.

G. C. Wilson & Company, 2 North Passaic Ave., Chatham, N. J.

Skylike SOLVES A LIGHTING PROBLEM

at the SHERATON-CADILLAC

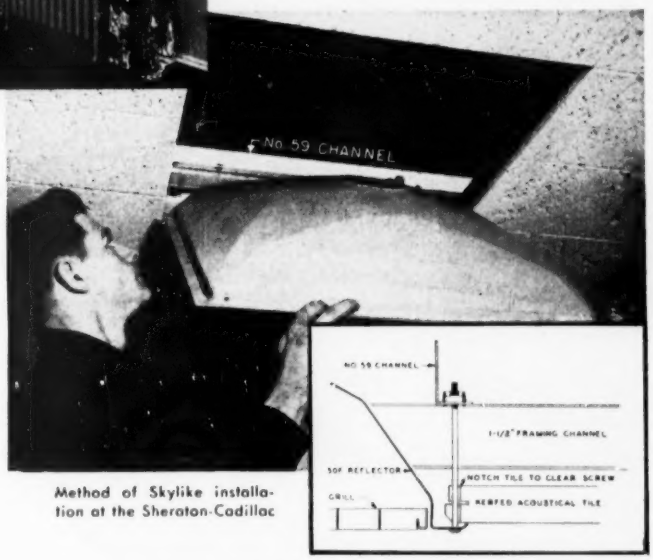
Bedroom suite at the Sheraton-Cadillac using Skylike units

THE PROBLEM . . .

Major renovations of this famous hotel involved air conditioning for the guest rooms. To complete the modernization acoustical ceilings were installed. Hotel management wanted recessed lighting units which would harmonize with any decorative scheme and provide comfortable well diffused illumination.

THE SOLUTION . . .

Recessed SKYLIKE incandescent units using 200W lamps were chosen and installed in the new hung ceiling construction. Sheraton-Cadillac engineers developed a special mounting device for the reflectors which would allow them to be supported from the ceiling framing members without need of bolts or other fastening devices. This permitted adjustment and alignment of fixtures after acoustical panels were installed. (See insert)



Method of Skylike installation at the Sheraton-Cadillac

Skylike ...

This modern, versatile unit can solve your lighting problems as successfully as it has in countless installations throughout the country in . . .

DEPARTMENT STORES
OFFICE BUILDINGS
HOUSING DEVELOPMENTS
SCHOOLS, ETC.
RETAIL STORES
THEATRES
BANKS

SKYLIKE
A SILVRAY-ASSOCIATED COMPANY

SEND FOR COMPLETE DETAILS

A comprehensive 8-page booklet describing the SKYLIKE system and its simple installation is yours for the asking. To get your free copy, fill in and mail the coupon below.

SILVRAY Lighting, Inc., 101 West Main St., Bound Brook, N. J.
Gentlemen:

Please send me complete information on Silvray **SKYLIKE**

Name _____
Firm _____ Title _____
Address _____
City _____ Zone _____ State _____

1. Westinghouse Application Engineer
2. Westinghouse Sales Engineer
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Do you put a full team on the field when you tackle a motor and control application problem? Are you cashing in on the know-how of your local staff of Westinghouse application engineers? Take a look at this line-up:

Your local Westinghouse sales engineer has a broad knowledge of all Westinghouse Motors and Controls. He knows their capabilities and limitations. He knows how to match motors and controls for maximum production.

Your local Westinghouse application engineer is equipped to analyze any motor and control problem and then develop the best solution. He can handle any application problem from a simple machine tool to a complete production line.

Your local Westinghouse product engineer is a specialist in one type of motor or control. These men work at the local level but operate from a manufacturing headquarters office.

Enlist the services of these men on your next motor and control application job. Call your local Westinghouse office for further details, or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-21746

Application engineers work out of 126 Westinghouse offices

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Albuquerque, N. M.	3-1826	Fresno 1, Cal.	4-5097	Providence 3, R. I.	GAspee 1-0818	Springfield 3, Mass.	6-8373
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Atlanta 2, Ga.	ATwood 1642	Greenville, S. C.	3-7755	Roanoke 4, Va.	6263	Toledo 4, Ohio	GArfield 4625
Augusta, Maine	3-4571	Hammond, Ind.	RUssell 8937	Rochester 7, N. Y.	MOnroe 1635	Trenton 10, N. J.	2-4136
Baltimore 2, Md.	PLaza 0300	Hartford 3, Conn.	5-0851	Rockford, Ill.	2-3452	Tulsa 3, Okla.	3-3191
Beaumont, Tex.	4-1481	Houston 2, Tex.	CHarter 4691	Rutland, Vt.	3292	Utica 1, N. Y.	4-1194
Binghamton 62, N. Y.	2-6403	Huntington 1, W. Va.	7146	Sacramento 14, Cal.	Gilbert 3-6525	Walla Walla, Wash.	5124
Birmingham 3, Ala.	53-2411	Indianapolis 9, Ind.	MArket 3301	Saginaw, Mich.	4-2640	Washington 6, D. C.	NAtional 8-8843
Bluefield, W. Va.	3-9131	Jackson, Mich.	2-0519	St. Louis 1, Mo.	CEntral 1120	Waterloo, Iowa	4679
Boston 10, Mass.	Liberty 2-0600	Jackson, Miss.	6-4839	Salt Lake City 1, Utah	5-3413	Watertown, N. Y.	1400
Bridgeport 8, Conn.	4-0151	Jacksonville 6, Fla.	78-6492	San Antonio 5, Tex.	GArfield 5114	Wheeling, W. Va.	6222-6223
Buffalo 3, N. Y.	WAshington 3966	Jamestown, N. Y.	8939	San Diego 1, Cal.	MAin 8151	Wichita 2, Kansas	5-2631
Butte, Mont.	2-2301	Johnstown, Pa.	81-257	San Francisco 8, Cal.	EXbrook 2-5353	Wilkes-Barre, Pa.	3-1144
Canton 2, Ohio	3-9171	Kansas City 6, Mo.	HArrison 7122	Seattle 4, Wash.	MAin 0808	Williamsport, Pa.	4289
Cedar Rapids, Ia.	7638	Kingsport, Tenn.	3769	Shreveport, La.	4-5298	Worcester 8, Mass.	4-2648
Charleston, S. C.	9904	Knoxville 8, Tenn.	2-8101	Sioux City 4, Iowa	5-7634	York, Pa.	7851
Charleston 1, W. Va.	37-565	Little Rock, Ark.	4-0367	South Bend 4, Ind.	3-7167	Youngstown 3, Ohio	4-1118
Charlotte 1, N. C.	5-3731	Los Angeles 17, Cal.	MAdison 6-3881				
Chattanooga 2, Tenn.	7-4361	Louisville 2, Ky.	CLay 0212				
Chicago 54, Ill.	WHitehall 4-3860	Madison 3, Wis.	5-4868				
Cincinnati 2, Ohio	GArfield 2250	Medford, Ore.	2-8289				
Cleveland 13, Ohio	CHerry 1-7600	Memphis 3, Tenn.	8-8546				
Columbia, S. C.	3-8823	Miami 4, Fla.	2-1553				
Columbus 15, Ohio	MAin 5527	Milwaukee 2, Wis.	DAly 8-1800				
Corpus Christi, Tex.	3-9237	Minneapolis 13, Minn.	GRanville 3545				
Dallas 1, Tex.	Riverside 5231	Mobile, Ala.	8-5443				
Davenport, Ia.	3-2761	Nashville 3, Tenn.	42-3505				
Dayton 2, Ohio	ADams 9153	Newark 2, N. J.	MArket 2-0200				
Denver 2, Colo.	KEystone 8121	New Haven 10, Conn.	5-3191				
Des Moines 8, Iowa	2-0244	New Orleans 13, La.	RAymond 8656				
Detroit 31, Mich.	TRinity 2-7010	New York 5, N. Y.	WHitehall 3-4321				
Duluth 2, Minn.	7-1541	Niagara Falls, N. Y.	9700				
El Paso, Tex.	2-5691	Norfolk 10, Va.	5-1639				
Emeryville 8, Cal.	OLympic 2-3770	Oklahoma City 2, Okla.	REgent 6-1633				
Erie, Pa.	24-867	Omaha 2, Nebr.	HArney 8700				
Evansville 8, Ind.	5-7146	Peoria 3, Ill.	2-5439				
Fairmont, W. Va.	501	Philadelphia 4, Pa.	EVergreen 2-1200				
Fergus Falls, Minn.	4250	Phoenix, Ariz.	4-3158				

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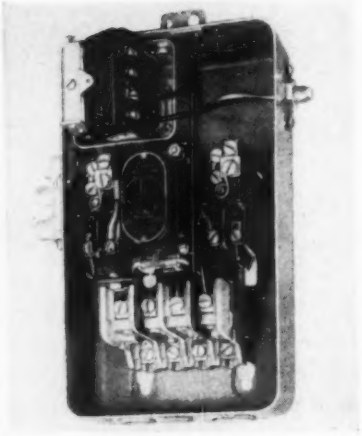
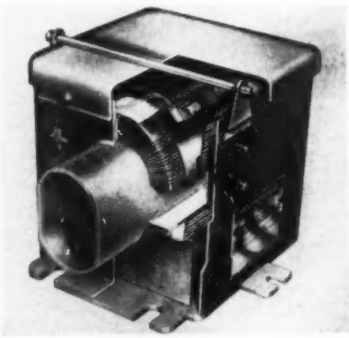


Magnetic Starter (25)

A new pressure operated magnetic starter, designed for application on pumps and air compressors, combines a starter, pressure switch and automatic unloader valve in one enclosure. Case measures $6\frac{3}{16}$-in. by $10\frac{1}{2}$-in. by $4\frac{3}{16}$-in. Available in 3 sizes up to 5 hp at 220-550 volts single phase or 10 hp at 440-550 volts polyphase. Pressure switch can be supplied in series "G" with capacity of 80 lbs. or series "H" at a maximum of 200 lbs. Direct mounting of control on motor eliminates problem of locating control and reduces wiring and conduit requirement. Bulletin 5304 available.

Furnas Electric Co., McKee St., Batavia, Ill.



Current Transformer (26)

A new through type current transformer for outdoor service, Type FWO. Transformer is available in 200-, 400-, and 800-amp primary current ratings. The 200/5 ampere rating meets ASA 0.3 accuracy standards at B0.1 burden, as do the 400/5 and 800/5 ampere ratings at B0.1 and B0.2. Both the 200/5 and 400/5 ampere transformers have a rating factor of two and the 800/5 of 1.5. The secondary terminal block is inside the metal case, and an obrotund, silicone glass laminate tube provides an opening suitable for single-phase, 3-wire, or 3-phase, 4-wire metering of standard 600-volt power cables. Also provision for a secondary conduit connection.

Westinghouse Electric Corp., P. O. Box 2099, Pittsburgh 30, Pa.

Reflector Lamp (27)

The Colorbeam reflector lamp line has been expanded. A full color scale of 14 color permanent lamps in bulb-sizes and wattages ranging from 75 to 300 watts. Supplementary colors have been added to R-30, R-40 and PAR 38 Colorbeams. The R-30 "Baby" Colorbeams and R-40 standard, are applicable for indoor decorative effects, while PAR 38 is adaptable for both indoor-outdoor floodlighting service. A new feature is the bulb design called "Hi-Dome", which counteracts stresses and strains. Rated average life of Colorbeam is 2000 hours. Reflector lining is silver. Bulb is interchangeable with ordinary reflector lamps. Literature available.

Amplex Corporation, 111 Water St., Brooklyn 1, N. Y.

Transformers (28)

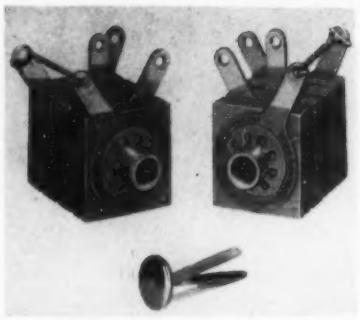
A new group of dry type transformers recommended for use to: stepdown power line voltage for operating electrical equipment such as machine tools, pumps, compressors, rectifiers, welders, infra-red and resistance ovens, electric furnaces, saws, motors; to insulate or isolate lighting and other circuits from power circuits; for boosting low line voltage or lowering high line voltage; distributing power from 600, 480 or 240 volt lines; to furnish proper voltage of low voltage lines; also phase changing. Made in all standard sizes up to 200 kva.

Hindle Transformer Co., Inc., Flemington, N. J.

Ballast (29)

A new 4-lamp ballast operates four LP or HP FLA certified cold cathode lamps and is made in two types, either for operating lamps at 100 or 120 MA. Lamps operating on new 100 MA 4-lamp ballast produce 2230 lumens and on 120 MA produce 2450 lumens per lamp. When using the 100 MA 4-lamp ballast, the overall lumen efficiency is approximately 48 lumens per watt.

Cold Cathode Equipment Company, 2347 E. Nine Mile Road, Hazel Park, Mich.

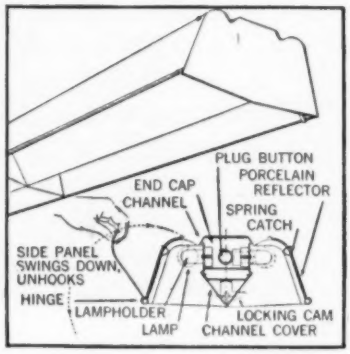


Rectifier (30)

A small single phase bridge rectifier, Type D-3575, for the operation of magnetic devices such as relays, solenoids and electric counters. Unit is designed for use directly from 117 volt ac systems and is rated to deliver an output of 9 watts at 90 volts dc, continuous duty. With the addition of a 3 mfd or larger filter capacitor, rectifier will deliver 117 volts dc for operation of devices normally designed for this voltage. The magnetic device, therefore, can be used in conjunction with rectifier to operate directly from conventional 117 volts ac line. Rectifier measures $\frac{13}{16}$-in. by $\frac{13}{16}$-in. by $1\frac{1}{4}$-in. mounting dimension and terminals extend $\frac{3}{8}$-in. above plates.

International Rectifier Corp., 1521 E. Grand Ave., El Segundo, Calif.

(31)



INDUSTRIAL Pacemaker includes upward illumination of factory lighting in a rugged unit with major reflecting surfaces in porcelain enamel bonded to steel. Available for two 40 watt pre-heat—two 40 watt rapid-start—two 85 watt pre-heat—or two 72 watt slimline. Removable side panels swing down for maintenance. The 4 ft, 5 ft, or 8 ft. sections may be mounted singly or continuously. Chain hangers, cable clamps, and stems allow variation of suspension. Manufacturer is F. W. Wakefield Brass Co., Vermilion, Ohio.

Protector Circuit (32)

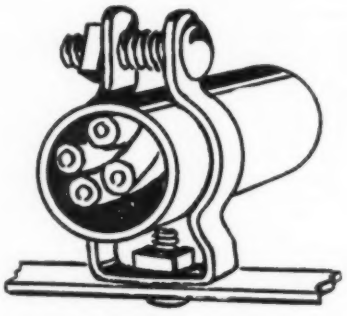
"Mini-Breaker" is now available in 10 ampere rating to provide improved circuit protection for small motors used in appliances, blower fans, and similar applications. It carries Underwriters' Laboratories listing. Mini-Breaker is a precision-built, thermally actuated circuit protective device. It interrupts excessive overloads and short circuits, tripping, instantly on "short", yet featuring a built-in time lag to handle temporary starting overloads and line surges. Literature available.

Mechanical Products, Inc., 1824 River St., Jackson, Mich.

Circuit Breakers (33)

A new line of circuit breakers known as "E-Z-Red". These thermal-magnetic breakers are approved by Underwriters' Laboratories, Inc. Available in ratings of 15, 20, 30, 40 and 50 amp. Construction features are: housing is molded plastic, tamper resisting; self-aligning, silvered bronze contact jaws, reinforced with pressure spring clip for positive contact; operating handle has two positions "on" and "off"; indicator shows when breaker is tripped and circuit open. Enclosures can be had for surface and flush mounting, capacity from 1 to 20 single pole breakers. Bulletin W. C. B. 53-1 available.

Wadsworth Electric Mfg. Co., Inc., Covington, Ky.

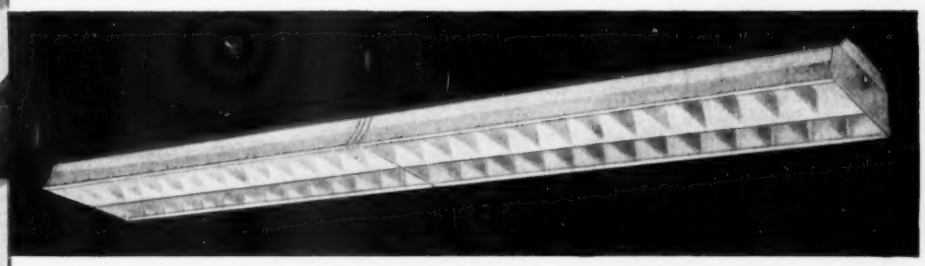


Conduit Hanger (34)

A new conduit hanger designed to save installation time and labor. Hanger's carriage or stove bolt-locks tighten with one tool. Fitting is made of heavy gauge steel overlaid with zinc after fabrication. Hanger is to be used on straight runs, no offsetting into boxes. It fits heavy wall conduits from $\frac{3}{8}$ to $1\frac{1}{4}$ inches, thin wall conduits from $\frac{1}{2}$ to $1\frac{1}{2}$ inches.

Blackhawk Industries, Dubuque, Iowa

Report card on the new "20/20"



newest, finest lighting for schools

First in its class! The new "20/20" is designed to rate highest in lighting efficiency, ease of installation and economy of operation. Restyled for added attractiveness, the complete line offers you new opportunity to provide more satisfactory levels of illumination within the limits of your budget.

Available in:

- 2-lamp and 4-lamp 40W Fluorescent or Rapid Start
- 2-lamp, 4 and 8-foot Slimline
- 4-lamp, 4-foot Slimline
- 1 piece 8-foot channel using 4 40W lamps, 2 in parallel—2 in tandem
- Metal or styrene side panels

Available with Slide Grip Hanger for mounting anywhere along the channel.

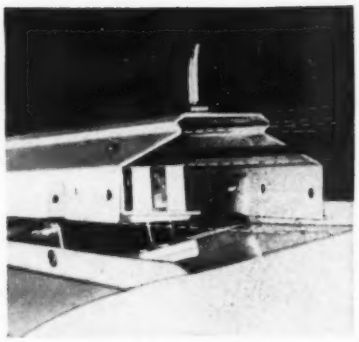
Electro Silv-A-King, one of the industry's most comprehensive sources for every type of lighting, offers you two manufacturing and shipping points to insure rapid delivery of Fluorescent, Incandescent and Floodlighting fixtures for commercial and industrial use, indoors and outdoors. Only Electro Silv-A-King also offers you the "Basic Unit" which permits easy interchangeability of 7 luminaries on one basic chassis . . . and the "One-Man" Speedy Hanger that cuts installation man hours in half.

For completely illustrated catalog, write to . . .

ELECTRO SILV-A-KING CORP.

2000 West Fulton Street, Chicago 12, Illinois

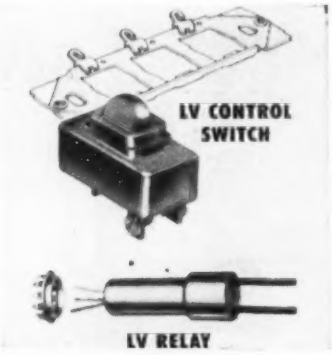
Fairfield and State, Bridgeport 5, Connecticut



Fluorescent Fixture (35)

Incorporated in the ORTHO-77 fluorescent lighting fixture is a new plug-in feature. Fixture is designed to be mounted on Uni-Race, a rigid sectional channel that provides automatically exact fixture spacing with calculated clearance between units, positive alignment and a continuous open wireway. Receptacles are wired-in at spaced intervals and clamped into pre-set slots in Uni-Race. Plug-in socket in fixture makes contact with receptacle when fixture is closed. Fixture becomes completely dead when opened and, being wired in parallel circuits, does not disturb other fixtures when removed. It may be safely handled without disconnecting circuit. Ballast replacement or repairs can be made "on the job" by replacing fixtures rather than parts. Catalog available.

Gibson Manufacturing Co., 1919 Piedmont Circle, N.E., Atlanta, Ga.



Switches and Relays (36)

Flexibility and versatility are features of new low voltage control switches and relays. These are components of new 24 volt switching systems—LV control. Individual LV control switches mount on standard Despard type straps. Any interchangeable type of plate, either colored plastic, mirror, brass, satin or polished metal can be used with this LV switch. Key operated switches are also available. Relays are rated 20 amperes, 120 volts ac, ½ hp or 20 amperes, 277 volts ac for fluorescent loads. Relay design is two-coil type. Automatic switching of all circuits is possible with master control contactor. All or major circuits may be operated by burglar alarms, photoelectric cells, time switches, etc. Control of any

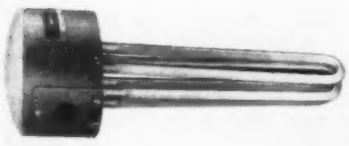
circuit from several locations is possible with use of one or more manual selector switches. Ideal for residential, commercial or industrial installations.

Square D Company, 6060 Rivard St., Detroit 11, Mich.

Steps and Hand Truck (37)

One man retail delivery of heavy cases and crates has been made easier by a folding truck body step and a special stair-climbing hand truck. A hinged, folding step is lowered from the rear bumper of a standard parcel delivery body, which is a shallow 3-step rise from the ground to the floor of the truck body. Using a lightweight hand truck equipped with a special caterpillar belt tread, driver is able to slide heavy load up or down the steps. Tread rotates about two sets of wheels set 18 inches apart on underside of truck to provide stair-climbing feature. Boyertown body is available in 6, 8, 10 and 12 foot lengths. It can be mounted on any forward control or flat faced cowl chassis from ½ ton to 1½ ton capacity.

Boyertown Auto Body Works, Boyertown, Pa.



Immersion Heater (38)

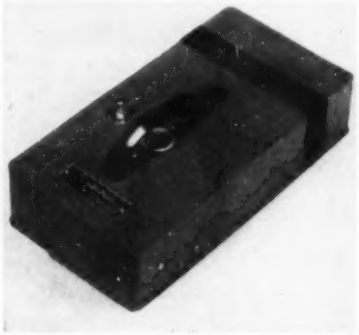
A new flanged tubular-type electric immersion heater has been added to this line. Heating elements are available in two sheath materials. Type TM-4, for water heating, has copper sheathed elements brazed to a brass flange. Type TMO-4, for use in oil or paraffin, has steel sheathed elements welded to a cast iron flange. Both types are single phase only and available in 120, 240, 480 and 550 volt ratings with capacities ranging from 4 to 12 kilowatts. Bulletin SD-169 available.

Edwin L. Wiegand Co., 7637 Thomas Blvd., Pittsburgh 8, Pa.

Time Switch (39)

The new 3000 Series "Memory Master" time switch replaces Paragon's 300 Series. "Torsion clutch" dial drive allows for free movement of dial, permitting manual check of "on-off" switching operations. The dial separates day and night and was designed for easy reading. Special dial trippers are provided. Additional trippers can be added without removing dial to provide for 16 operations per 24-hour period. Unit is UL approved for 30 amps capacity at 120 or 240 volts.

Paragon Electric Company, Two Rivers, Wis.



Detector (40)

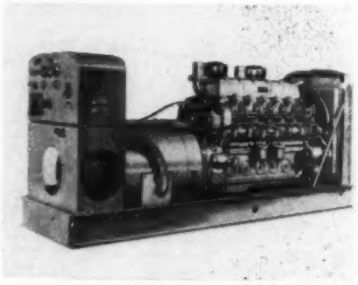
Model 202 detector locates outlet boxes, conduit, steel reinforcements, heating pipes, etc. in walls. To operate, the detector is adjusted to a particular wall and then operator covers wall area holding the instrument about an inch away. When a conduit is crossed or a wall box approached, a loud squeal sounds in the speaker. It is powered by standard, low cost dry cell batteries. It can also be used to detect lost tools and other metal objects covered over by soil and sand. Literature available.

Detectron Company, 5420 Vineland Ave., North Hollywood, Calif.

Annunciator (41)

The DE line of ACS-C1 annunciators are new simplified alarms with specific advantages for designers, builders and users of graphic control panels. They measure 3⅛-in. by 3¼-in. by 11½-in. Can be used with either normally open or normally closed field signals. Signals its own failure as well as system defects. Provides both normally open and normally closed auxiliary set of contacts. Available with a variety of light boxes—backlighted name plates with or without call-back toggle switch, bullseye types, etc. Bulletin available.

Scam Instrument Corporation, 3909 W. Irving Park, Chicago 18, Ill.



Generating Sets (42)

A new line of Diesel-electric generating sets in capacities of 20 to 75 kw. Units are powered by 2-cycle diesel engines. Sets come with four types of controls: emergency automatic, which takes over on full load the instant of regular power source failures; semi-emergency automatic, which handles partial service upon failure; electric starting, which is controlled manually with an operator distributing power at will; and remote electric starting, which can be started from any of several distant points by pushbutton. Complete switchboards are included with both ac and dc models, including, as standard equipment, all required controls. Both ac and dc models are rated for continuous duty and conform to the standards of NEMA and AIEE. Bulletin Z-8 available.

Diesel Division, Harnischfeger Corp., Crystal Lake, Ill.

Connectors (43)

Hubbell interlock electrical connectors feature an automatic locking connection that can never disconnect accidentally. The plug locks automatically when plugged in and can be disconnected when desired. This locked, vibration proof connection has constant low contact resistance and makes contact on two separate surfaces which are under constant coil spring pressure. Any decrease in contact pressure on one contact surface will be automatically increased on the other surface. Various types are available: automatic locking plugs and jacks, both metal and insulated; right angle plugs, connectors, and splicing links; flexible aluminum terminal strips that can be cut to any length and bent or curved to any shape for form fitting wiring design; and a 4 in 1 test prod with interchangeable attachments that lock automatically to prod coupler. Literature available.

Harvey Hubbell, Inc., State & Bostwick Ave., Bridgeport, Conn.

Compare

See how Life-Line Starters give you a better installation on every job

The time required to install starters can make or break your job profit. That's why it pays to compare Life-Line Starter with any other motor control for easier installation—on every job.

1. *Deep-drawn, lift-off* cover exposes more of the mechanism—speeds wiring. Plenty of knock-outs, too, for easy conduit connections.

2. *Straight-through wiring* saves wire, saves time, eliminates hunting for "missing" terminals. Line terminals at the top, load terminals at the bottom—all plainly marked—all front-accessible.

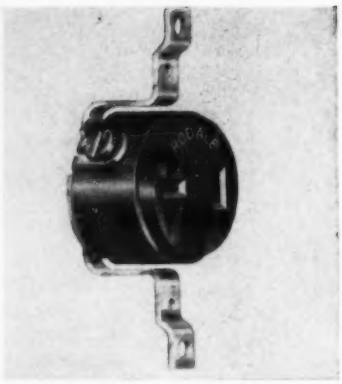
3. *Pressure-type connectors* end looping of wires and provide quickly made, low-resistance connections for either solid or stranded wire.

4. *NEMA standard mounting* dimensions and wiring sequence eliminate guesswork.

Customers get a break with Life-Line Starter, too. Simplified design and rugged construction combine dependability with exceptionally low maintenance over millions of operations.

For complete facts, see your Westinghouse Representative or write for DB 11-200, Westinghouse Electric Corporation, Box 868, Pittsburgh 30, Pennsylvania. J-30158

YOU CAN BE SURE...IF IT'S Westinghouse



Receptacle (44)

A newly-designed 10 amp, 2 wire "T" polarity flush receptacle has been added to this line. It is listed as Catalog No. 1040, and features self-finding slots, double-wiping contacts, and extra large binding head screws for ease-of-wiring. Also interchangeability with all other types on the market. It is rated 10 amp, 250 volts, 15 amp, 125 volts. It is designed to accommodate standard single outlet plates.

Roadale Manufacturing Co., Inc., Emmaus, Pa.

Master TV System (45)

Master TV systems for old or new apartment houses and other large buildings, with the new resistor outlet box. Television amplifiers are used to select and amplify the TV signal. Line splitters provide branch lines for risers, so that tap-offs can be made with resistor outlet boxes, for each apartment.

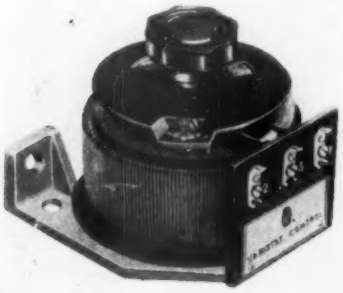
Blonder-Tongue Laboratories, Inc., 526-536 North Ave., Westfield, N. J.

Distribution Capacitors (46)

An improved line of Inerteen distribution capacitors for universal application in high and low temperatures. They will withstand energizing at temperatures as low as minus 40°F. They will operate at or above industry standard ambient of 104°F. Improved line has been made possible by coordinating internal design to make it suitable for a wide temperature range with a change in composition of In-

erteen dielectric fluid. Solder-sealed bushings and zinc spray finish insure trouble-free operation under all weather conditions.

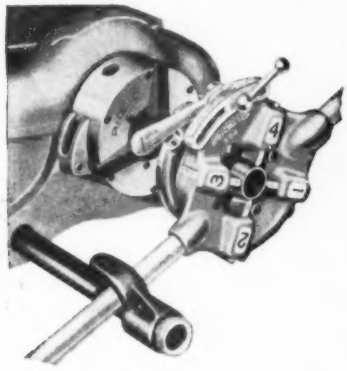
Westinghouse Electric Corp., P. O. Box 2099, Pittsburgh 30, Pa.



Dimmer **(47)**

A new, low cost autotransformer dimmer, named Varistat, has been added to this line. They are designed for controlling intensities of low capacity lighting circuits found in school stages, churches, homes, night clubs and restaurants. Varistat is a continuously adjustable autotransformer mounted on an alloy base. The toroidal transformer core, made of strip-wound silicon steel, is precision single layer wound with insulated wire. A brush track surfaced with silver assures low contact resistance to wear and corrosion. Ratings: 2,000 watts, 110-120 volt, 60 cycle, continuous duty. Operating torque 30 to 60 inch ounces. Net weight 15 lbs.

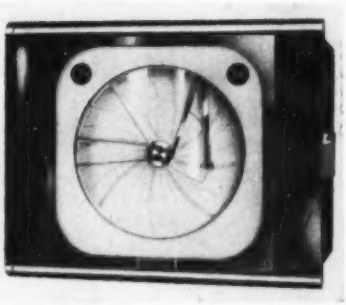
Ward Leonard Electric Co., Mt. Vernon, N. Y.



Threader **(48)**

New "504" pipe threader is self-contained and can be quickly adjusted to thread 1-in. to 2-in. pipe using one set of dies. The quick-opening handle retracts dies instantly without stopping power drive. Dies can be adjusted without removing threader from machine. Threader fits all standard power drives. It will cut oversize, undersize and extra long threads. Other features include one set of high-speed steel dies and a pre-set 4-jaw centering guide.

The Ridge Tool Company, Elyria, Ohio.



Controllers (49)

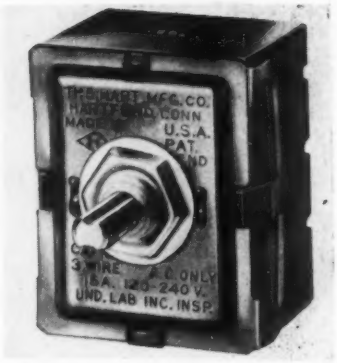
Electronic dynamaster recording potentiometers are available in the form of time-temperature program controllers. They regulate temperature according to a predetermined schedule of changing values. Any desired program, such as a heating, soaking, and cooling cycle can be maintained. The desired schedule of temperatures is prescribed by the contour of a transparent plastic cam. The same controller can be used to maintain any number of different temperature programs, since cams of different contour are easily cut and interchanged. Bulletin No. P1255 available.

The Bristol Company, Waterbury 20 Conn.

Portable Tower (50)

A new portable "Up-Right" tower of aluminum alloy makes possible mobile ultra high frequency communications. Tower is built by setting individual sections one on top of the other. Each folding section is assembled without tools. Some of the features are (1) resistance to movement which would interrupt or deflect line of sight radio waves, (2) capacity to withstand high wind and ice loadings, and (3) light weight material so constructed to be easily moved to new locations and put into operation. Inside stairways, non-skid platforms, a complete system of hand rails, and other safety features are built into tower sections. Varying types of antenna may be mounted on towers as required individually or in groups by means of multi-purpose antenna mounts.

Up-Right, Inc., 1013 Pardee, Berkeley, Calif.



Switch (51)

A two-pole motor reversing switch with ratings of 1 hp at 120 volt, 2 hp at 240 volt, ac. This new "Diamond H" model, one of the 850 series, is designed for washing machines and other appliances, air conditioners, home workshop power tools and similar applications involving a single-phase motor whose direction must be reversed. "Auto-lock" connections provide instant, positive hook-up, without binding screws or extra clips, by pushing striped end of standard wire (solid or stranded) into connection. Switch measures 1-21/32-in. by 1-27/32-in. by 1-7/32-in. It is available with or without housing and with lever, pointer dial or other type handles.

The Hart Manufacturing Co., Hartford, Conn.

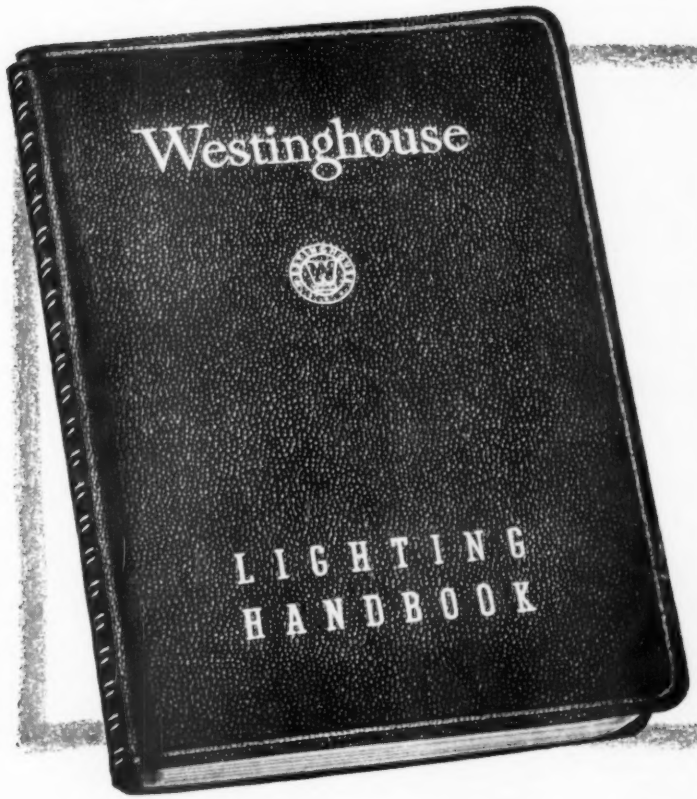
Electric Range (52)

A new built-in electric range with eye-level oven, which may be installed at any height, in any location desired. Cooking elements may be placed anywhere, on counter tops, in units of two or four, or more. Ovens available in grey, silver, copper and gold. Cooking elements in white porcelain, stainless steel, and grey enamel. Wattages are: bake, 2400 watts; broil, 3000 watts. Control panel features an automatic timer clock, a minute minder, and temperature control with signal lights. Cooking tops may be flush mounted in any counter top. The two-element tops have one 6-inch (1500 watt) and one 8-inch (2100 watt) elements. Four element tops have two 6-inch and two 8-inch elements.

Thor Corporation, 2115 South 54 Ave., Chicago 50, Ill.

Vital Lighting Information

you'll use in the next 30 days



List of Contents

actual size:
7½ x 5¼ inches—235 pages

Most complete pocket size lighting handbook . . . yours for just $2.00

Here in one book is a ready-reference and short-cut to all the practical lighting information available today. It briefly, but completely, covers theory. It then goes into the facts and data you need. With it, you can suggest and estimate the best possible lighting—at the lowest possible cost.

This Westinghouse lighting handbook belongs in your desk or brief case. You'll refer to it many times. To get your copy promptly, please fill out and mail the coupon today!

YOU CAN BE SURE...IF IT'S

Westinghouse

WESTINGHOUSE LAMP DIVISION, DPT. EC-10, BLOOMFIELD, N. J.
Please send me.....number of lighting handbooks at $2.00 each.
☐ Enclosed is my check ☐ Bill me

NAME.....

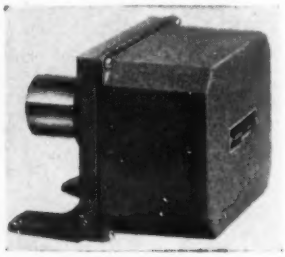
ADDRESS.....

CITY.....ZONE.....STATE.....

Time Switches (53)

A new line of time switches for controlling "on-off" cycles of one hour or less, known as Inter Matic Series T670. They are recommended for controlling commercial refrigeration defrosting, automatic poultry feeders, industrial process timing, fans, valves, blowers, lawn sprinklers, and other applications requiring intermittent operation. Design of switches permit up to 12 "on-off" operations on the same time dial. Each operation is independently adjusted by means of trippers which provide variable settings ranging from 5 to 60 minutes. Changes in length of timing periods is made by resetting trippers. Tripper has small time scale stamped on face. Available in 125 and 250 volt models. They may be used as: single pole, single throw—circuit normally open; or single pole, double throw—circuits alternately open and closed. Bulletin NR No. 1 available.

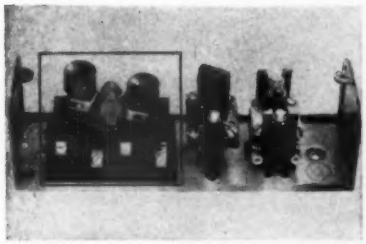
International Register Co., 4262 W. Washington Blvd., Chicago 12, Ill.



Control (54)

A new high speed "fail safe" photoelectric control for protective type applications, such as bin or liquid level, travel limit, safety, combustion, smoke detection, registration controls. The control is "fail safe" in that the plate relay is energized when the light beam is on the photoelectric tube and all tubes are operating; interruption of light beam or failure of lamp or a tube denergizes the plate relay to open (or close) a circuit. Other features include a quick response dc circuit with speeds to 1200 operations per minute, sensitivity adjustment, and complete enclosure in a splashproof, cast aluminum case. Type F control can be supplied with either built-in or remote photoelectric head and a wide selection of light sources. Plate relay contacts are SPDT, rated 15 amps at 115 volt, ac. Literature available.

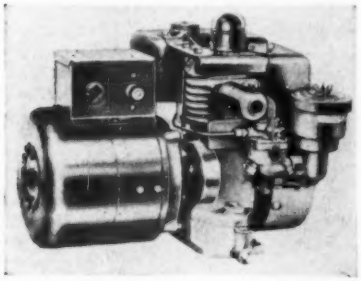
Autotron Company, Danville, Ill.



Pushbutton (55)

A new snap-action over-center toggle pushbutton, consisting of two 2-point units—each with one normally open and one normally closed contact—is a permanently assembled unit. Rating is 10 amp continuous, 50 amp maximum interrupting at 110 volts ac and two amperes maximum interrupting at 125 volts dc. By making proper connections, it can be used for 3-point applications, or it can be used for 2-point service by applying one half of unit. Available in seven colors, and in open form or in a surface-mounted sheet steel enclosure.

Westinghouse Electric Corp., P. O. Box 2099, Pittsburgh 30, Pa.



Electric Plant (56)

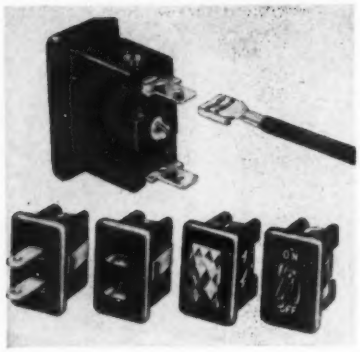
A re-designed electric plant, Model 550, which is five pounds lighter than former, 2½-in. shorter and 6-in. lower. It develops 500-550 watts, ac, 110-120 volts. It is suitable for construction projects, home stand-by service, industrial applications, for lighting and for powering tools in remote areas. Weight is 73 pounds. Plant has an over-sized, self-excited, self-regulated generator providing good voltage regulation. Engine is one-cylinder, four-cycle. Available with either manual starting or electric starting. Bulletin AXE-2 available.

Universal Motor Company, 498 Universal Drive, Oshkosh, Wis.

Controller (57)

A new line of free-vane electronic controllers. They are part of the Series 500 line and are available as indicating or recording controllers for temperature, pressure, flow, liquid level, humidity and time program control. Based on a unique frequency modulation principle, they are offered for low-open, high-open, low-high, low-open-high or low-normal-high control, as well as proportional input control. Bulletin B226 available.

The Bristol Company, Waterbury 20, Conn.



Devices (58)

Snap-In switches, outlets, pilot lights and inter-connecting load plugs are now available with spade terminals for A-MP "Quick Connect" connectors as well as with standard screw terminals. "Snap-Ins" are instant-mounting devices designed to save man-hours on assembly lines in the manufacture of both major and traffic appliances, air conditioning, ventilating, and many other types of equipment. They are pushed into mounting holes where spring clips hold them in place. Switches are rated 15 and 20 amp, 1250 volt; 10 amp, 250 volt, ac and also are available with hp ratings. Pilots are rated 115 volt or 230 volt, ac.

Hart Manufacturing Co., 110 *Bartholomew Ave., Hartford, Conn.*

Indicator (59)

A compact phase sequence indicator measuring approximately 7 by 2½ by 2½ inches and weighing 1½ lbs, is intended as a time saving tool for electricians, maintenance men, and engineers. To determine phase rotation, attach alligator clips to power mains and one of the lights will glow showing either 1-2-3 or 3-2-1 rotation. Instrument can be used to determine polyphase motor rotation, transformer and alternator connections, and for any job where phase sequence information is desired. Unit may be used on 110, 220, 400 volt lines without modification or use of external resistors. It covers a frequency range of 30 to 300 cycles and 300 to 1000 cycles at flip of a switch. Indicator is provided with 18-in. test leads.

United Manufacturing Co., Hamden, Conn.

Product Briefs

(60) Howard Industries, Racine, Wis., has developed a new EMC shaded pole **motor,** Model 3000.

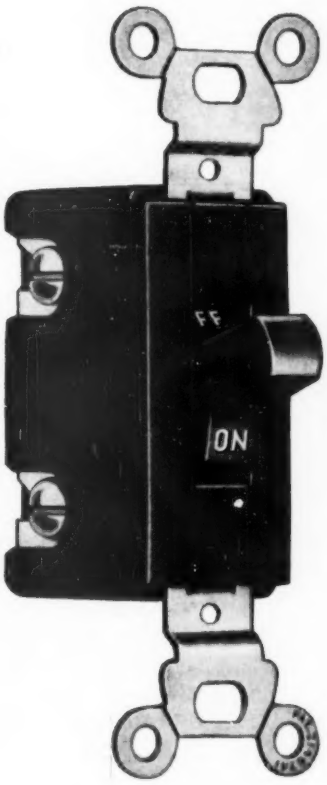
(61) A new **adapter** and **chuck** which converts ¼-in. drill to ½-in. capacity. Manufactured by Goodmark, Inc., Dayton, Ohio. . . . (62) Hexacon Electric Co., Roselle Park, N. J., has announced an improved pencil **soldering iron.** . . . (63) A new electric **sander-polisher** has been introduced by Wen Products, Inc., Chicago, Ill.

(64) Homelite Corporation, Port Chester, N. Y. has announced a new 30-pound, 5.5 hp gasoline **chain saw,**

Cut Job Costs with this New Bryant

A.C. QUIET SWITCH

Rated 15 Amperes, 120 Volts . . . 15 Amperes, 277 Volts



No. 4801

In single pole, double pole, 3-way and 4-way with Brown or Ivory handles.

The new 4801 line of Bryant A.C. switches offers you radically new and improved features now permissable under recently adopted Underwriters' and Code Standards. For commercial, institutional, industrial and residential applications look to this quality-built Bryant switch for lower wiring costs and vastly improved electrical service . . . here's why —

1. The 4801 is the first switch permitting full ratings for use on fluorescent (inductive) loads. The 15 Amperes at full rating use means triple that of existing 10 Ampere switches for these applications. *This means fewer switches and lower job costs.*
2. Capable to the full rated capacity for *tungsten filament lamp loads.*
3. New 277 Volt rating provides for the popular 4-wire 480/277 Volt distribution system now being specified in many areas.
4. The 4801 is *ideal for Motor Control,* safely handling full load currents up to 80% of the switch rating.
5. *Much longer life* due to rugged construction and use of fine silver contacts.
6. *Back wiring* using full screw-clamp type of fastening already proved in installations, or conventional side wiring.
7. *Extremely quiet* . . . almost silent . . . due to unique mechanism design.
8. *Every modern feature* . . . strength . . . fully enclosed . . . easy, smooth operation . . . takes up to #10 wire . . . operates in any position.

Specify Bryant From Your Electrical Distributor

Listed by Underwriters' Laboratories, Inc.

BRYANT
SUPERIOR WIRING DEVICES

THE BRYANT ELECTRIC COMPANY

Bridgeport 2, Connecticut

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J-99897

Model 5-30. . . . (65) Du-Fast, Inc., New York, N. Y. has introduced an improved Hi-speed sander–polisher **attachment** which fits any ¼-in. electric drill. . . . (66) A new No. 92 **locking wrench** is in production by the Utica Drop Forge & Tool Corp., Utica, N. Y.

(67) Two electric **lanterns** which are moisture-proof, dust-proof and shock-proof construction. Manufactured by Star Headlight & Lantern Co., Inc., Honeoye Falls, N. Y. . . . (68) Remington Arms Company, Inc., Bridgeport, Conn., has announced two new **studs** for their powder actuated Model 450 Remington stud driver. . . . (69) Ray-O-Vac Company, Madison, Wis., has added the Hunter **lantern**, equipped with a flasher button for signaling, to its line.

(70) Precision Equipment Co., Chicago, Ill., has announced production of all-steel "Little Gem" **cabinets** for storing small parts. . . . (71) American Silver Company, Inc., Flushing, N. Y., has developed a new "Braze-Clad" silver brazing **metal strip** for use in the electrical, electronic and communications equipment industries. . . . (72) A new **solder pot** called Model 88 is made especially for printed circuit work. It is manufactured by Dee Electric Co., Chicago, Ill.

(73) An adjustable **drill** has been developed by the Hayden Twist Drill Co., Detroit, Mich. . . . (74) New reversible air-operated **screwdrivers** and nut **setters** have been announced by Thor Power Tool Company, Aurora, Ill. . . . (75) A new all-purpose **power tool** is for smoothing, drilling, polishing, and engraving all types of hardnesses of metals and most other materials. Manufacturer is Selectric Products Company, Lynwood, Calif.

(76) RCA-5690 is a "Special Red" **vacuum rectifier tube** especially designed for industrial and aircraft applications. Manufactured by Radio Corporation of America, Harrison, N. J. . . . (77) Blonder-Tongue Laboratories, Inc., Westfield, N. J., has developed a 2-piece **remote control** unit with which any B-T television amplifier may be operated from the "on-off" switch . . . (78) A new collapsible **stand** for use with the Quijada Chief type threading machine is being introduced by Gaines-Collins Co., 5474 Alhambra Ave., Los Angeles 32, Calif.

(79) A new TV lead-in **weatherhead** called Tenna-Shingle, has been announced by Javex, Redlands, Calif. . . . (80) A new **paint** that stops fire from spreading has been developed by Fyr-Kote Co., a division of Morris Paint & Varnish Co., Omaha, Nebr. . . . (81) A four-speed **switch control** developed for use with the two largest models of Trade-Wind Clipper kitchen and small room ventilators is now being supplied by Trade-Wind Motorfans, Inc., Los Angeles, Calif.

(82) J. H. Holan Corporation, Cleveland, Ohio, has introduced a truck-mounted, power operated **derrick**, Series 3100.

CATALOGS and BULLETINS

(83) AERIAL CABLES, self-supporting, with aluminum conductors; complete dimensional information, current capacity tables, physical and electrical characteristics. 8-page bulletin. The Okonite Company.

(84) HIGH-SLIP MOTOR for punch press service; discussion and illustrations of design, ventilation, and construction features; rating and frame sizes, speed-torque curve, dimensional information. 4-page bulletin. General Electric Co.

(85) PORTABEE WELDER with self-contained motor generator for welding, brazing, grinding, sanding, polishing; supplies power from power unit, charges batteries; information on accessories. 4-page bulletin. Generator Sales Company.

(86) HEATING & AIR CONDITIONING PARTS; description and prices of more than 9,000 parts and supplies relating to refrigeration, electric motors, air conditioning, and heating. Fall and winter catalog. Harry Alter Co., Inc.

(87) AIRCRAFT MOTORS, high frequency induction type, 3-phase ac, from 1/20 to 16 hp; used for controls in aircraft components; illustrations show testing methods; performance curves give load, frequency, starting and voltage characteristics. 8-page bulletin. U. S. Electrical Motors, Inc.

(88) OIL CIRCUIT BREAKERS for outdoor use in ratings of 1,000 and 500 mva at 34.5 kv, 500 mva at 23 kv, and 500 mva at 46 kv.; descriptions, ratings, illustrations. 16-page bulletin. Brush Aboe Inc.

(89) DRY-TYPE TRANSFORMERS, totally-enclosed, non-ventilated, in ratings from 3 to 50 kva, for indoor or outdoor service. 8-page illustrated booklet. Westinghouse Electric Corp.

(90) CUBICLE SWITCHGEAR for heavy-duty service in electric utility generating and distribution substations; station-type unit consists of large-capacity heavy-duty power circuit breaker, isolating disconnecting switches, connections and bus; photographs and drawings show details of construction and operation. 24-page booklet. Westinghouse Electric Corp.

(91) SAFETY SWITCHES, front-operated, visible-blade type; description of Type A, ACI through 1200 amps, Type A double throw through 600 amps,

Type D through 400 amps; photos, diagrams, dimensions and specifications. Federal Electric Products Co.

(92) MOTOR STARTERS, Type H, for control of squirrel-cage, synchronous, wound rotor and multi-speed motors from 2200 to 5000 volts; description and diagrams of short-circuit, overload, time relay undervoltage and pull-out protection and typical methods of control; 12-page bulletin. Allis-Chalmers Mfg. Co.

(93) DRIVE-IN THEATRE LIGHTING fixtures, including entrance and exit driveway, ramp and aisle markers, mushroom lights, column lights, moonlighting units, floodlights, and ceiling swivel lights; descriptions, dimensions, weights, prices and mounting information. 4-page bulletin. Steber Manufacturing Co.

(94) PORTABLE POTENTIOMETER for checking calibration of applications using thermocouples or pyrometer-type instruments; contains direct-reading temperature, millivolt and extended range scales; wiring diagrams, instructions and specifications. Minneapolis-Honeywell Regulator Co.

(95) ELECTRODE SELECTOR CHART with up-to-date information on complete line of welding electrodes, including mild-steel, low hydrogen-low alloy, low alloy-high tensile, hard-surfacing, and stainless-steel electrodes; tables include welded properties, metal deposit analysis, technique, type of specification requirements met, description and advantages, and application data. 4 pages. General Electric Co.

(96) SPEED REDUCERS, including in-line units, special units for right-angle drives, and special units for a particular industry; features, manufacturing techniques and applications. 15-page booklet. Westinghouse Electric Corp.

(97) LIGHTNING ARRESTERS, multi-purpose, valve type, self-supporting, single pole; dimensioned sketches, application and impulse protective characteristics, information on accessory parts Ohio Brass Co.

(98) DISTRIBUTION TRANSFORMERS, Class B insulated 80 deg. C. rise dry-type; ratings up to 600 volts, 3 through 15 kva for indoor or outdoor service, higher ratings to 100 kva for indoor service only. 4-page bulletin. Wagner Electric Corp.

(99) CIRCUIT BREAKER PANELBOARD for lighting and appliance branch circuits; features plug-in breakers, snap-on covers over neutral bar and main lugs, positive trip identification; descriptions of arc extinction, positive trip action and other design features. Westinghouse Electric Corp.

(100) HIGH VOLTAGE HANDLING TOOLS for use with high voltage switches, fuses and cutouts; included are socket-type fittings for removing and replacing SMD-type fuses, a Locking Prong fitting to hold power fuses during handling, remotely-operated clamps in three types, and universal poles in lengths from 4 to 20 feet. Catalog Section 823. S&C Electric Co.

(101) ELECTRONIC CONTROLLERS for temperature, pressure, flow, liquid level, humidity and time program; information on frequency modulation principle of control unit, data on combinations of indicators or recording pens available, examples of applications, and complete specifications. 16-page bulletin. The Bristol Co.

(102) STEEL FRAMING MATERIAL for racks, supports, hangers, fittings, benches, trusses, platforms, and scaffolds; installation photographs, illustrations, engineering data charts. Catalog No. 100. Ainsworth Manufacturing Corp., Mult-A-Frame Div.

(103) STEP VOLTAGE REGULATORS, single-phase, 60 cycles; regulation of plus or minus 10% in 32 equal steps in 0.625% of the rated voltages; especially suitable for branch and rural distribution lines; illustrations show internal construction, operating principle, switch and drive mechanisms, and wiring diagram. Maloney Electric Co.

(104) DISCONNECT SWITCH for group operation as an arrester or oil circuit breaker disconnect; two-insulator, horizontal-break action; available for upright, inverted or vertical mounting; back-to-back mounting may be used for six-pole operation; complete listings and dimensions for all standard voltage ratings from 7.5 kv, 400 amperes, to 161 kv, 1200 amperes. 6-page bulletin. H. K. Porter Co.

(105) CABLE ACCESSORIES CATALOG; information on potheads, filling compounds, paints and allied items, joints, connectors, rolling tools, drawbenches, tie wire, armor rods, accessories for ACSR and steel ground wire; section on joint design with cross-sectional views of typical joints. 200 pages. Anaconda Wire & Cable Company.

(106) PYROMETER SUPPLIES, including general thermocouple assemblies, components and special purpose items; discussion of selection, care and application of thermocouples. 48-page catalog. Minneapolis-Honeywell Regulator Co.

(107) HEATING CONTROLS and their application to building temperatures, hot water heating, and warm air heating; schematic diagram, applications diagrams, description of operation. Automatic Devices Co., Inc.

INSTALLATION: Society for Savings, East Hartford, Connecticut. Branch, East Hartford, Connecticut.

ELECTRICAL CONTRACTOR: Gunning Electric Co., Hartford, Conn.

FIXTURES: Litecontrol No. 5924 2 lamp slimline recessed troffers, 4' long, using No. 9015 Holophane Low Brightness Lens.

SPACING: 9'-0" on centers.

CEILING HEIGHT: 9'-6" approximately.

INTENSITY: 50 Footcandles average in service, over work area.

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LITECONTROL Fixture 5924 and smart planning lift this lighting installation out of the ordinary. There is little exposed brightness because the fixtures are recessed, with Holophane 9015 Low Brightness Lenses.

Crosswise layout of lamps increases apparent width of the bank. Continuous lighting lines concentrate intensity over the work areas. Broken lines furnish all that's needed over the light colored floors.

The entire layout — lighting, painting and simple arrangement of furniture — produces a clear, workable, comfortable room.

NOTE — LITECONTROL Fixture 5924 provides unusual efficiency, simple installation and maintenance.

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QUESTIONS from readers on problems of industrial equipment, installation, maintenance and repair. Answered by electrical maintenance engineers and industrial electrical contractors out of their experience. For every question and every answer published we pay $5.00.

Reader's Quiz

Excessive Running Current of Motor

QUESTION X23—On a 7½ hp 220 volt 3 phase motor installation, the contractor was held to close wiring design tolerances due to cost factor. Using motor nameplate rating which was close to Code tables, switch and branch circuit were installed.

When the motor was energized it was found that the actual full load motor current was 150% of the manufacturer's nameplate rating. In this instance would it be the responsibility of the contractor to replace switch and wiring with the proper size?

Is it standard practice to test motors for actual current under full load before installation or can the nameplate rating generally be depended upon to give the actual full load current?—D.H.M.

ANSWER TO X23: The question as to whose responsibility it is to rectify the condition is one for the lawyers I'm afraid. But as to the technical questions involved, I would say that the nameplate rating on the motor can be relied upon. The full load current must be within ±10% of the nameplate rating.

If the actual current drawn under load is 150% of the nameplate rating, then the following possibilities may exist. The most common is low voltage, with the load constant. Run the motor at higher voltage wherever possible. The second is that the voltages are unbalanced and therefore the line current unbalanced.

If it so happens that the currents on all three phases are different it may be that the highest current was initially measured. Remember to measure the voltage at the motor terminals as it may be that the design did not allow for the voltage drop in the lines (you mention a "close wiring design" in your question) and therefore the motor may be actually operating at low voltage.

The next thing to check is the motor itself. If this is all right, then there has been an error made in calculating the motor size.

In any event, *it is definitely dangerous to run the motor with 150% of the line current rating.* First this means that the motor is drawing 50% more power than the motor manufacturer allowed in his design; and secondly, owing to the I^2R loss, there is 2.25 times as much copper loss as allowed for in the design of the motor, and the motor will surely burn out in a very short time. *DO NOT RUN THE MOTOR.*—H.H.S.

ANSWER TO X23: The motor nameplate should show actual full load current at rated voltage, and is usually almost identical with the value shown in the Code tables. However, since in this case the actual current is 1½ times that shown on the nameplate, there are four possible causes:

(a) The motor is overloaded. In this case either the load should be reduced or a larger motor installed.

(b) The motor has been rewound or otherwise altered so that the nameplate data no longer applies. Occasionally an uninformed service man will turn an induction motor squirrel cage rotor in a lathe to improve its appearance. This increases the air gap, and full load current climbs sharply.

(c) The voltage may be too low at the motor terminals, either from low supply voltage or from voltage drop in the feeder. DHM mentioned the job was held to close tolerances because of the cost factor, and it is possible that the length of the feeder was too long for satisfactory use of the minimum size wire permitted by the Code.

(d) The motor has a shorted coil or other defect which causes high current. A check for unbalanced line currents may disclose this condition.

Who would be responsible for correcting this trouble would depend largely on whether the owner or the contractor were to blame for the condition. If the contractor selected the wrong size conductors and switches for a known load, he should pay for correction. If the owner's load is heavier than estimated, or if he is responsible for furnishing a defective motor, corrections would be at his expense.—D.H.N.

ANSWER TO X23: In 30 years working at the electrical trade I have never found a single motor that drew 150% of nameplate current if it is in good condition, properly loaded (not overloaded), and properly connected. They sometimes draw as much as 15% more than nameplate date, but not 50%. My advice would be to:

1. Check the mechanical load to see that you haven't got a 10 hp load on the 7½ hp motor.

2. Check the motor connections carefully to see if you have the windings connected in delta instead of star, or a coil reversed in a split winding.

If you are not familiar with motor connections it might pay to get a good motor man to check it out for you.

As for responsibility, it has been decided in court a lot of times that when a contractor makes a bad guess it is his responsibility and he is stuck with it. "Close wiring design tolerances due to cost factor" is often just another way of saying that the customer is chiseling and if you can't get the job at a price that will make a little money, don't take it. The customer or the motor manufacturer may assure you that a certain motor will pull a certain load, but the contract usually makes you responsible, and if it doesn't work you are just stuck.—J.H.B.

Restoring Residual Magnetism

QUESTION Y23—What is the proper method to restore residual magnetism in a dc generator? I have not seen any standard procedure used. It all seems to be on a hit or miss basis. The "book" says the proper way is to send a dc current of proper direction and magnitude through the field windings. As yet, I have to see a dc generator with polarity markings. Is there any way to determine brush polarity when the generator is not producing? —A.R.

ANSWER TO Y23—One simple method of restoring residual magnetism of a dc generator is by means of a six (or twelve) volt automobile battery. With the generator shut down, disconnect the positive shunt field lead from the positive generator terminal. (With respect to polarity it is almost standard to connect the negative shunt field lead to the generator negative terminal at the generator, with the generator's negative being that terminal brush collector, connected to

the commutating and series fields). Connect the positive terminal of the battery to the positive shunt field, through the field switch and field rheostat. Connect the negative battery terminal to the negative shunt field lead, usually the generator lead from the commutating winding. With the rheostat in about the central position, or with all the resistance in the circuit, close the field switch. (As a precaution to protect the battery, a 30 ampere fuse can be included in the circuit). Cut all the field resistance out. Cut the resistance in. Slowly open the field switch. Remove the battery and reconnect. With the generator running, with the field switch open, all field resistance cut in, read the armature volts. There will be a slight deflection, possibly two or three volts. Close the field switch. If the voltmeter goes to zero the field has been flashed in the wrong direction. Shut the generator down. Follow the same precedure, except reverse the battery terminals.—J.B.P.

ANSWER TO Y23—You can develop your own method or procedure to energize lost residual magnetism on dc motor-generator field exciter set. Should you have time and the machine available, while it is still working properly, you can proceed and install a dc line with a rheostat in series so as to regulate the voltage to the machine under question (voltage to be equal to or under the rating of the machine). Polarized flexible leads should be set up to correspond to the polarity of the field leads. When ready to apply the dc to the generator be sure the brushes have been raised (unless you are going to apply the flash method that is: when all wires are connected but one end, this end is put on the last contact and lifted immediately, thereby causing a flash). This method is quick, it does save time in a production plant.

If you have a machine that is frequently interrupted by the loss of its residual magnetism, I would look into the reason for its action. One thing to watch is polarity; should it be opposite polarity, you must be quick in breaking the point of contact because of the counter-electric-motive-force build-up that the brushes will spark at the commutator, if continued will destroy the commutator.—O.C.

Glass Insulation

QUESTION Z23—How does glass insulation function when a fault develops in the motor or wiring due to the breakage of the glass insulation at some point? Glass is supposed to become a conductor at very high tem-

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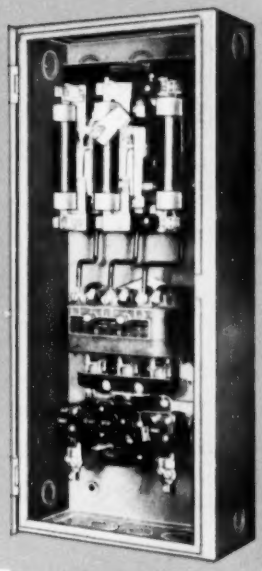
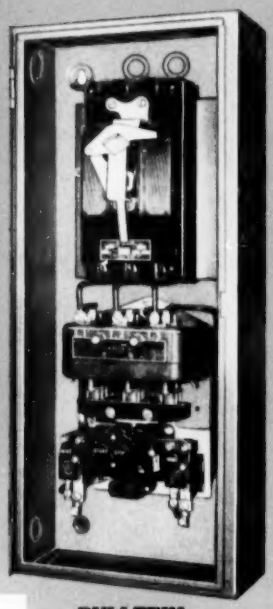
CLARK TYPE "CY" COMBINATION STARTERS

RICIAN

CLOSED VIEW BULLETIN 6018 6020 NEMA 1 OR 1A ENCLOSURE



BULLETIN 6018 WITH DISCONNECT SWITCH



BULLETIN 6020 WITH CIRCUIT BREAKER

The basic unit of Clark Type "CY" Starters, Sizes 2 and 3, features Twin Break Contacts and Twin Blowout Coils.

Combined in minimum space for the first time in Electrical Control history, this construction forces the arc to rotate.

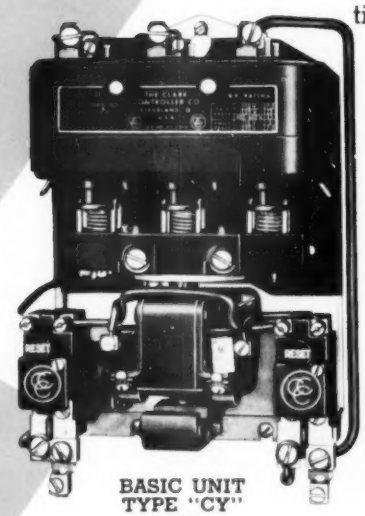
The arc never strikes twice in the same place during quenching. This means longer contact life, less maintenance.

Bulletin 6018 uses this incomparable starter together with a quick make-quick break Disconnect Switch.

Bulletin 6020 combines a high interrupting capacity air Circuit Breaker with the basic Type "CY" unit.

Both Disconnect Switch and Circuit Breaker are interlocked with the formed sheet metal cover, and are front operated.

Available in NEMA Type 1, 1a, and 12 enclosures, all with Safe Edge formed openings.



BASIC UNIT TYPE "CY" SIZE 2

NEMA 12 ENCLOSURE SAFE EDGE CONSTRUCTION

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CLARK TYPE 'CY' ENCLOSURES for *Every Industrial Atmosphere*

NEMA TYPE 9 EXPLOSION RESISTING FOR HAZARDOUS DUST LOCATIONS, CAST ENCLOSURE

NEMA TYPE 5 DUST-TIGHT ENCLOSURE

NEMA TYPE 12 FORMED SHEET METAL ENCLOSURE

The sensational new Clark Type "CY" Starter, with its Twin Break Contacts and Twin Blowout Coils sets a new "High" in AC MOTOR CONTROL.

Note the steel arc chambers in the drawing below.

See how the Blowout Coils are concentric with the contact.

This construction forces the arc to rotate, never striking twice in the same place.

The top of the arc box is closed. No ionized gases accumulate around the terminals.

Bulletin 6018 starters with Disconnect Switch, and Bulletin 6020 with Air Circuit Breaker are available in types of enclosures to meet every industrial atmospheric condition.

Also available, but not illustrated are NEMA Types 4-7.

Cutaway view showing steel arc chambers and blow out coils concentric with contacts. Closed top on arc box prevents accumulation of ionized gases around terminals.

THE CLARK CONTROLLER CO.

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peratures. Would not a high temperature at some particular point cause the adjacent glass to become a conductor and cause a spreading short circuit?

During normal conditions glass is a very good insulator. Will the usual protective devices used on motors and wiring prevent this spreading short circuit?—E.B.

ANSWER TO Z23—I have had the opportunity to observe a number of motors that were rewound with glass insulation as well as factory wound products, and it is my candid opinion the "spreading short circuit" you speak of is a legend which is strictly a figment of somebody's imagination.

At a Naval installation where I was formerly working I saw a standard 3 hp General Electric type K, 3 phase open frame motor which had been rewound, and a Jack and Heintz 28 volt dc totally enclosed aviation type motor put on the test bench and tested to destruction. They were brake loaded till they drew 300% of normal line current, and operated continuously. A circulating oiling system was put on the bearings. The open motor was so hot that spots of the winding glowed dull red when the room was darkened, but neither motor burned out till the bearings were worn out and allowed the rotor to drag.

In view of the above it appears to me that glass insulated wire will stand more than the rest of the motor, and the next step is to beef up the bearings and provide a better way to cool them. —J.H.B.

Connections for 3-Phase Motors

QUESTION A24—Can you tell me why they use two types of connections in three phase electrical motors? Why do they design one for delta and one for star connections? Is there an advantage in one over the other?—R.E.G.

ANSWER TO A24—Prior to World War II many industrial plants had 220 volts for power. Then came the change to 440 volts and as can be readily seen this created a problem in conversion of electric motors among those that were especially designed for one voltage. They had to either be reconnected internally if possible, rewound or else new motors purchased. With the advent of dual voltage motors, this made possible 110-220 and 220-440 volt motors in single frames thereby resulting in an economy to the purchaser and in the case of an important machine, the motor would not have to be sent to a motor shop to make the new connection if the plant was

changed to a higher operating voltage. Primarily, the star connection enables a motor to be used on a higher line voltage by 1.73 times while the delta connected motor has a greater current carrying capacity than the star.—L.C.D.

ANSWER TO A24—I would suggest R.E.G. refer to the book "Practical Electricity" fourth edition by Terrell Croft and published by McGraw Hill Book Co. Inc., New York. In this book section 51, Polyphase Circuits and Systems, Article 850 beginning at the bottom of page 606 on through the article 861 ending on page 617 will answer his questions in a very understanding way.—G.W.L.

Tube Voltage on Slimline Lamps

QUESTION B24—What is the tube voltage on a slimline fluorescent light? These tubes are 8 feet long and are plugged into 110 volt outlets.—E.S.H.

ANSWER TO B24—The autotransformer type ballasts which are used to supply the starting and operating voltages for slimline fluorescent tubes are designed to supply an open circuit voltage of 750 volts, when connected to the normal 110 volt supply. This is the voltage which is impressed on the slimline lamp at the instant of starting, before the gas in the tube ionizes and the lamp lights. 96 inch T-8, or 8 foot slimline lamps are available in three wattage ratings: 29-W, 51-W, and 69-W. Naturally each of these lamps has a different operating current. These currents each cause a different degree of saturation in the ballast transformer and result in three different operating voltages for the three types of lamps. These voltages are approximately: 335 volts at 0.1 amp for 29-watt lamp, 295 volts at 0.2 amp for 51-watt lamp, and 265 volts at 0.3 amp for 69-watt lamp.—L.D.B.

Can you ANSWER these QUESTIONS?

QUESTION N24—What can I expect in efficiency and voltage regulation using 3-100 kva 25 cycle 6900v primary 440 volt secondary when I use them on a 60 cycle service, same primary and secondary voltage at one-third, two-thirds and full load?

There seems to be quite a difference of opinion on this subject. I would appreciate some definite figures if possible.—W.H.B.

QUESTION P24—We have many old rheostats lying around which are still in good condition. I want to connect these together in a tandem mounting to control the speed of a five horsepower 220 volt slip ring motor. How do I determine the resistance and maximum current of the rheostat needed?—H.G.C.

QUESTION Q24—I have an ohmmeter which works fine when taking resistance measurements except when measuring resistances of grounds. Then just by reversing the ends of leads to the binding posts of meter I get widely different readings. Ordinarily reversing the leads to binding posts makes no difference. Once in a while I get a negative reading on ohmmeter when taking ground readings. What causes this? Is the true reading the average of both readings? What causes the negative reading? Is it caused by electrolytic battery action of the ground pipe and soil?—E.B.

QUESTION R24—We have a 3 phase electric motor which was designed originally for Formvar insulated wire. We would like to rewind this motor and put in glass insulation and glass insulated wire, but we find there is not enough room.

Could we decrease the number of turns in the coils or would it be better to decrease the wire size?—R.E.G.

QUESTION S24—We have been asked to convert a number of dc fans, 12 and 16 inch to ac. Do any readers have a simple selenium rectifier circuit, showing the components necessary for furnishing this dc power to 12 inch and 16 inch commercial dc fan motors. —L.W.F.

QUESTION T24—Why is it that fluorescent tubes that no longer produce any light, even if their filaments are in good electrical condition, become active again after establishing through them a high voltage discharge (low amperage), such as that produced by an automobile ignition coil?—J.R.S.

QUESTION U24—Is the winding in a 2300 volt, 75 hp slip ring rotor connected so that a current continues through all the windings, or are the windings separated into two different groups, one shunted together and the other terminating at the slip rings which are shunted by the controller?—E.S.H.

PLEASE SEND IN YOUR ANSWER BY NOVEMBER 15

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Answered by

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GLENN ROWELL, *Electrical Engineer, Fire Underwriters Inspection Bureau, Minneapolis, Minn.*
B. Z. SEGALL, *Consulting Electrical Engineer, New Orleans, La.*

Services—Multi Family Occupancies

Q. *Illustration No. 1 shows a service cable with a bare neutral feeding a main switch and fuse, and two meters located on the outside of the building wall. The system and service equipment is grounded as shown. From each meter, service cable with a bare neutral is run to the branch circuit panels located in each apartment. The apartments are wired with armored cable. I plan to ground the panels and the armored cable to the grounded neutral conductor in each apartment. I am told this is a Code violation and also that I cannot use service cable with a bare neutral beyond the main switch. Kindly explain the rules involved.*

Illustration No. 2 is an alternate method of wiring which I understand meets Code requirements. In this case the service entrance cable supplies only the two meters located on the outside of the building wall. The main switch has been eliminated. The service cable then proceeds on the outside of the wall as shown and enters the building near the service equipment in each apartment. In this case, I understand that the Code permits me to ground the system and the metallic enclosures direct to the water pipe or, as shown by the dotted lines, one ground could be made at the meter but the equipment in each apartment could be bonded to the ground wire of the service cable. It is difficult for me to understand, from a standpoint of hazard, how this installation which I understand is approved, is any safer than the one covered by illustration No. 1 which is not approved. In the second case, you have 7 or 8 times as much unprotected and uncontrolled service conductors as in the first case where the switch is installed at the meter location. In the first case you have protection and control of a high percentage of the service conductors and I cannot understand why the installation of the outside service switch should be discouraged, by the Code, in support of a more hazardous installation. Your comments would be appreciated.—O.P.G.

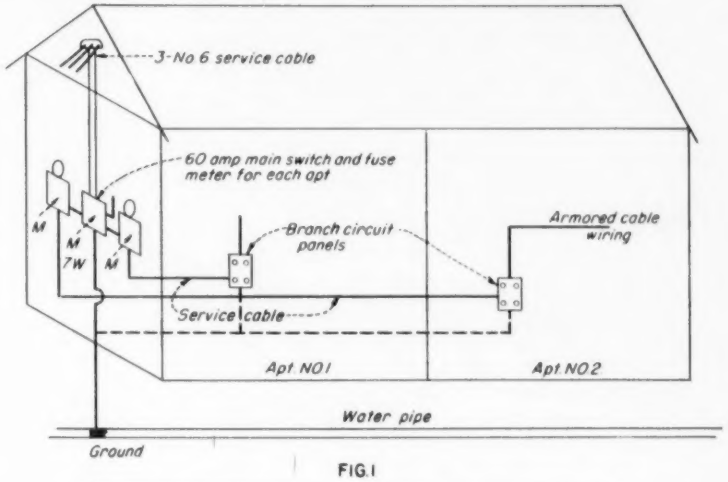


FIG.1

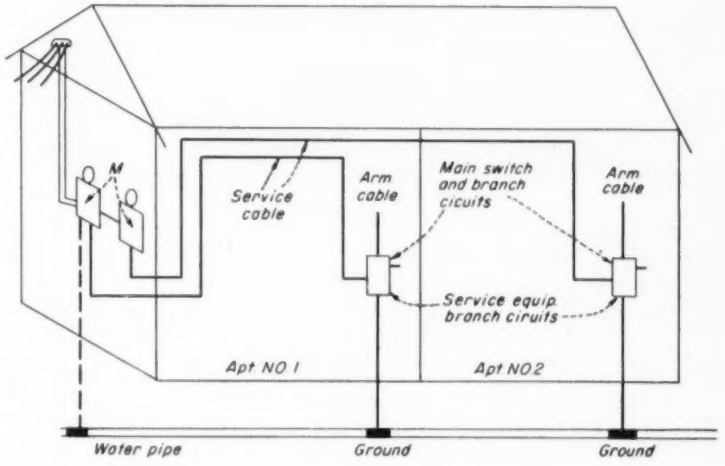


FIG.2

A. According to the definition of a service, service equipment and service entrance conductors, the service as shown by illustration No. 1 terminates at the service equipment. All wiring beyond the service equipment is classified as feeders or branch circuits. It therefore follows that we must not confuse the rules covered by Article 230 for services with the rules of Article 220 covering feeders. In the case in question, the conductors running from the outside meters to the panels in each apartment are feeders and the rules which apply to services do not apply.

While Section 2561 of the Code permits the grounding of the service equipment to the grounded service conductor, it definitely does not permit such procedure beyond the service equipment except by special permission, rule 2557-c, or for range frames covered by Section 2560. As a result, you could not, as you propose, ground the panels and the armored cable in each apartment to the system grounded conductor. It would therefore be necessary to run separate equipment ground conductors to the grounding electrode or bond the equipment to an equipment grounding conductor. The dotted lines clarify this point.

While Section 2303-b of the Code

recognizes a bare neutral for service conductors such procedure is not generally recognized by Section 3101 for other conductors. In the case of service entrance cable, however, (Section 3382) there is an exception for ranges, water heaters and feeders running to other buildings. Since the case in question is not covered by these exceptions, it would be a Code violation to run service cable, unless all wires were fully insulated, from the main switch to the panels in each apartment as shown.

In connection with Illustration No. 2, it appears to me, according to Section 2523, that the equipment could be grounded to the grounded conductor as shown in each apartment. It is difficult for me to explain the difference in hazard between the two cases, since I see little, if any, distinction. I believe the main consideration concerns the problem involved with multiple-occupany buildings. Section 2351 and 2371 recognizes, under certain conditions, the need for separate sets of service entrance conductors, service disconnects and service overcurrent devices for each individual occupant. As a result, we diverge considerably from the old concept of the main switch or switches, located where a service enters a building which protect and control all wires in the building. Section 2351-b and 2371 of the Code, covering multiple-occupancy buildings, implies that such protection should be provided and the use of the word "may" indicates permission only and does not imply that the procedure of installing several sets of service equipment is desired. Personally, I believe the rule should be considered in the light that resort to such procedure should be restricted to cases where it is impracticable to do otherwise. I agree with your comments with respect to the comparative hazard presented by the two methods and I am inclined to feel that the penalties which result when the main switch is installed on the outside part of the building should be considered for Code change especially where multiple-occupancy buildings are concerned.—B.A.McD.

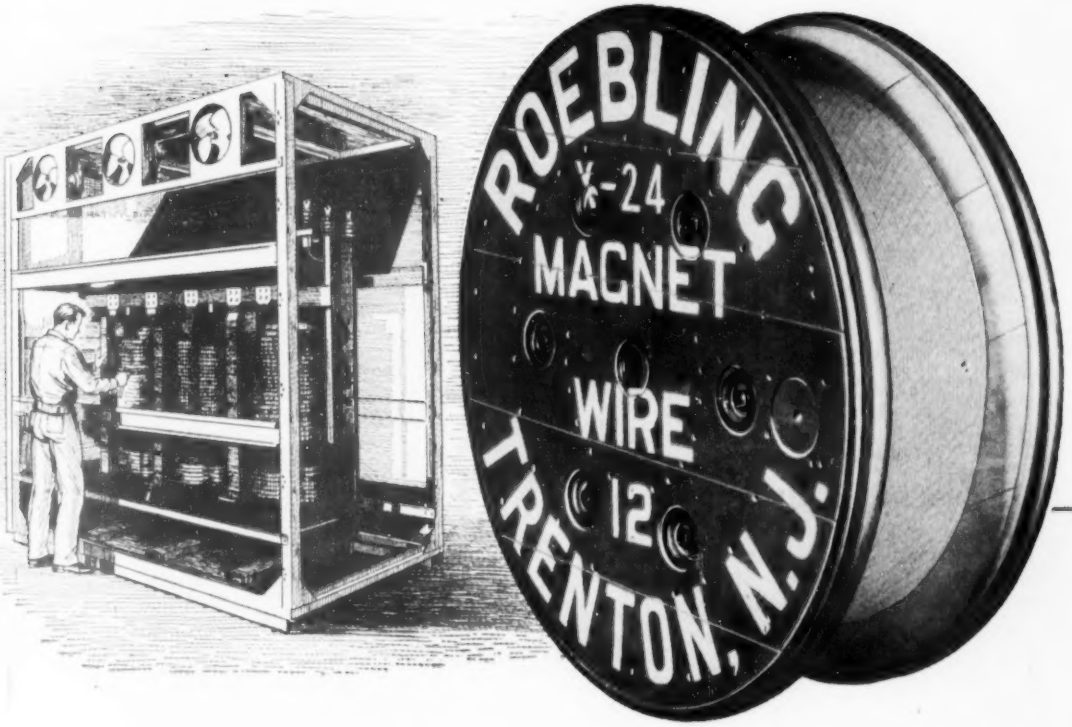
Type MI Cable

Q. *May the new type of wiring material, consisting of wires within a copper tube, be buried directly in the ground as a circuit extending beneath a concrete slab to a filling station pump island?*—F.E.

A. The wiring material to which you refer is known as Type MI or a mineral insulated metal sheathed cable and this cable can be

Now...a new high temperature magnet wire...

ROEBLING ROETEMP



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Roebling ROETEMP Magnet Wire is insulated with a specially processed tape applied in a single wrap with a liberal overlap. It is exceptionally pliable and bends without cracking or separating from the conductor. It won't unravel; is ideal for higher speed winding; comes in a range of sizes from #1 to #12 AWG, round, square and rectangular.

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placed underground provided soil conditions are such they will not cause corrosion of the copper jacket. Under Section 3302 you will note it may be used where exposed to weather or continuous moisture, for underground runs, and embedded in masonry, concrete or fill, in buildings in the course of construction or where exposed to oil, gasoline, or other conditions not having a deteriorating effect on the metal sheath. The sheath of mineral insulated metal sheathed cable exposed to the destructive corrosive conditions, such as some types of cinder fill, shall be made of or protected by material suitable for those conditions. Inasmuch as the only MI wiring now available has a copper jacket, its use underground should be limited only to those areas where tests have indicated no corrosive conditions exist which are injurious to copper. Sand or earth free of humus materials beneath paving will not have a corrosive condition injurious to copper.—G.R.

Motor Switching And Disconnecting Means

Q. *We have had some controversy over the intent of the first sentence of 4374. Is this in contradiction to the rest of this section?*—F.C.

A. No. The first sentence states, as do many Code rules, the general principles, i.e., "Control circuits shall be so arranged that they will be disconnected from all sources of supply when the disconnecting means specified in Section 4406 (The disconnecting means shall disconnect both the motor and the controller from all ungrounded supply conductors) is in the open position".

The next sentences just clarify the methods that may be used to satisfy the conditions of this principle for the disconnecting means. Thus the second sentence states the "disconnecting means may be two separate devices, one for disconnecting the motor and the other for disconnecting the control circuits. These are not required to be interlocked or arranged for simultaneous opening, they may be two separate and distinct switches or circuit breakers. However, if two disconnects are used then they "should be located immediately adjacent one to the other" as stated in the third sentence. Some inspectors feel that this should be mandatory. The balance of the section amplifies the construction with respect to the use of transformers, etc., for control circuit supply.—B.Z.S.

Type NMC Wire

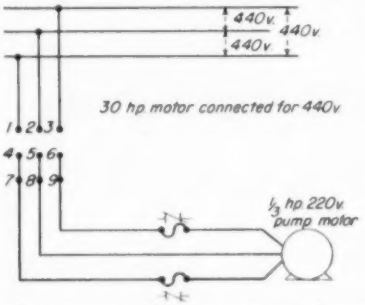
Q. *Can you tell me whether or not the Code will permit the use of the so-called barn wire for supplying convenience outlets located 15 inches above the floor of an amusement room in the basement? Two walls of this amusement room will be outside walls. If we can serve these convenience outlets by using this wiring material extended through the voids of the concrete block, we can provide a good job at a reasonable price, otherwise we will have to place the outlets at the ceiling due to the fact the blocks are laid in an ashlar pattern making it impossible for us to channel down to each outlet without destroying the appearance of the wall finish.*—F.C.

A. The so-called barn wire now known as Type NMC wire may be used within the voids of inside or outside masonry block or tile walls. Permission for this use may be found under Section 3362b of the new 1953 edition of the Code, which reads as follows: "This type of non-metallic sheathed cable may be used for both exposed and concealed work in dry, moist, damp, or corrosive locations and in outside and inside walls of masonry block or tile. If embedded in plaster or run in a shallow chase in masonry walls and covered with plaster within 2 inches of the finished surface, it shall be protected against damage from nails by a cover of corrosion-resistant coated steel at least 1/16 inch in thickness and 3/4 inch wide in the chase or under the final surface finish."—G.R.

Motor Windings

Q. *We would like to operate a ⅓ hp, 220 volt, 3 phase pump motor from the untapped windings of a 220-440 volt, 3 phase, 30 hp motor, running at 440 volts.*

We know brake solenoids are used in this manner on 220-440 volts, 3 phase motors. Will you let me know whether or not the diagram complies with the National Code.—E.O'C.



A. It is my opinion that the N. E. Code, at the present time, does not recognize the method you propose for obtaining 220 volts to operate the small ⅓ hp motor. Your proposal involves the use of the motor windings as an auto-transformer in addition to their normal function and I believe the circuit so derived would be in violation of Section 2003 which covers auto-transformers. I further believe that if the Code intended to cover such use, the matter would be fully covered under Article 430 on Motors and Controllers.

I realize however that the principle involved is applied to industrial sewing machines where the 120 volt lighting fixture is energized from the 250 volt motor winding. This combination however is listed by Underwriters' Laboratories and I believe is recognized by Inspection authorities as a special application which has been investigated, tested and approved by U. L. Under such conditions, the minimum requirements for safety undoubtedly is attained but unrestricted use of this principle could result in serious electrical hazards.

At the present time, the Electrical Committee of the N.F.P.A. are considering the possible need for Code recognition of "Special Application Equipment", and it is quite possible that the question you have raised might receive, in the future, some recognition by the Code under this heading.—B.A.McD.

Section 3011

Q. *The third sentence of this section reads "Conductors of light and power systems of 600 volts or less may occupy the same enclosure, without regard to whether the individual circuits are alternating current or direct current, only if all conductors are insulated for the maximum voltage of any conductor within the enclosure". I have a circuit installed in a raceway feeding a 240 volt motor circuit. I am using 600 volt wire for this. May I install another circuit, for which 300 volt wire will be ample, in this same raceway?*—R.P.

A. There is no question but that the 300 volt wire is "insulated for the maximum voltage of any conductor within the enclosure" and would therefore, be acceptable. It is of course assumed that all other Code requirements are satisfied. For example, assuming that the 600 volt wiring were being used for lighting installations instead of power, suppose that the installation required the use

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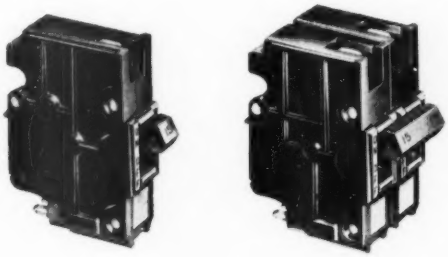

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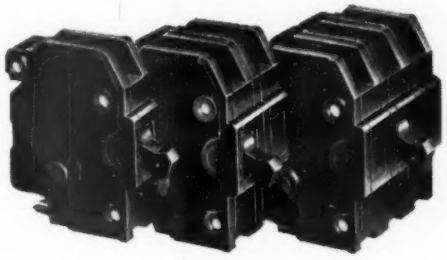

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of some Type AF wire in the same raceway. The problem of heat transfer from the fixture wire to the circuit wiring may preclude the use of the two types of conductors in the same enclosure.—B.Z.S.

Infra-Red Lamps

Q. *Can ordinary (medium) 660 watt porcelain base lamp sockets (unswitched) be used for 375 watt, 120 volt, infra-red lamps? Reference 4237.*—P.P.G.

A. According to Section 4237 of the N. E. Code, a medium base, unswitched lampholder of the porcelain type, may be used only with infra-red lamps rated at 300 watts or less. The same rule also advises that screw-shell lampholders shall not be used with infra-red lamps over 300 watts rating unless the lampholders are especially approved for the purpose. It therefore follows that *ordinary* medium base, unswitched, porcelain lampholders could not be used to supply infra-red lamps rated at 375 watts. As an example of a lampholder especially approved for the purpose, Underwriters' Laboratories, under Medium Base Lampholders, list the General Electric, Cat. No 95 X 823, lampholder for use with infra-red heating lamps. This lampholder has a porcelain shell, is keyless, has a medium base and carries a rating of 660 watts at 250 volts. In view of this U. L. approval, it appears that this particular lampholder would be approved for the case covered by your question.—B.A.McD.

Panelboard Loading

Q. *A 600 ampere, 3 phase, 220 volt distribution panel has a 1200 ampere connected load but the maximum demand is 300 amperes. Can I add additional loads? Panel has 3-60 amp circuits unused. Is a distribution panel in a factory limited to its ampere rating for connected loads? If this is so, many of our 600 amp panels would only have a demand of about 150 amperes. It seems a waste of panel, copper and apparatus to limit a panel in any occupancy to its ampere rating for connected load and not the actual demand. We have been in the habit of limiting the demand on a panel to 70% of its rating to reduce heating and voltage loss. Your comments will be appreciated.*—P.P.G.

A. The N. E. Code recognizes demand factors for feeders as

covered by Section 2203; for range conductors as covered by Table 29; and for motors as covered by Section 4316. While the Code does not cover any demand factor for panel boards, we do have a requirement under Section 3882 which limits the load to which a panel board may be subjected. This rule reads in part as follows:

> "Section 3882. A panelboard supplied by conductors having overcurrent protection greater than 200 amperes shall be protected on the supply side by overcurrent devices having a rating not greater than that of the panelboard".

This rule, in the case in question, would limit the actual load used at any time to 600 amperes. It is also obvious that the demand factors recognized in figuring the size of feeders serving motor loads as covered by Section 4316 may result, in some cases, in low demand factors. In such cases, the total connected load served by the panel would be high compared with the maximum demand on the panel. It therefore appears to me that the demands permitted in computing feeders are also concerned with the panels such feeders supply. Another factor worthy of consideration is the starting currents of motors. As an example, the three 60 ampere spare circuits might be used to supply 3-5 hp, three phase, 220 volt, squirrel-cage motors. The full load current of each motor is only 15 amperes. In order to start most of these motors, the branch circuit fuse block must be of a size to accommodate a 45 or 40 ampere fuse. In your example this would mean that the 3-60 ampere spare circuits with a total capacity of 180 amperes would only serve 3-15 ampere motors with a total load of 45 amperes.

I believe the foregoing comments indicate some of the problems which would arise if the Code definitely restricted the total load connected to a panel on the basis of its rated capacity; and I believe also answers your question. Back in 1945 this question was given considerable attention by the Electrical Committee of N.F.P.A. and a definite proposal covering "Capacity of Panelboards" was presented. This proposal was not accepted and the loading conditions was one of the factors involved with the decision.

I appreciate your comments with respect to panelboard use where the demands are low but we must also be careful not to overlook the hazards and the inefficient operation which results when some panelboards are loaded near rated capacity. Your policy to limit the demand on a panel to 70% of its rating is, in my opinion, sound and justified.—B.A.McD.

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Official N.E.C. Interpretations

INTERPRETATION NO. 394

(Issued August 12, 1953)

SECTION 7143—Disconnect means for Services Exceeding 600 Volts.

Statement: Paragraph a of Section 2351 of the Code permits not more than six switches or circuit breakers as a disconnecting means for services of 600 volts or less.

Question: Is it the intent of paragraph a of Section 7143, to prohibit that arrangement for services of over 600 volts, by requiring a single circuit breaker ahead of the individual circuits?

Answer: No, See Section 7152.

NATIONAL ELECTRICAL CODE, TENTATIVE INTERIM AMENDMENT NO. 98.

STATEMENT—The 1953 Advance Reports of the National Fire Protection Association contained a report of the Electrical Correlating Committee revising the 1951 Edition of the National Electrical Code. This Report included a proposed text for Section 5115, Article 510, covering Aircraft Hangars which was subject to further review.

In accordance with established procedure, Interim Amendment No. 98 was adopted on July 22, 1953, revising the original proposed text of Section 5115, and this new text is to be printed in the new 1953 Edition of the National Electrical Code with a proper notation calling attention to the action. (Copies of the new Code will be available after September 1, 1953).

DISCUSSION—The Amendment is as follows:

INTERIM AMENDMENT NO. 98

(Adopted July 22, 1953)

ARTICLE 510, Section 5115—Aircraft Hangars

Change Section 5115-b-3 to read:

3. The area within 5 feet horizontally from aircraft power plants, aircraft fuel tanks or aircraft structures containing fuel shall be considered to be a Class I, Division 2 hazardous location which shall extend upward from the floor to a level 5 feet above the upper surface of wings and of engine enclosures.

Change Section 5115-e-2 to read:

2. Lampholders of metal shell, fiber-lined type shall not be used for fixed incandescent lighting.

Change Section 5115-e-3 to read:

3. Portable lamps which are or may be used within a hangar shall be approved for Class I locations.

Change Section 5115-f-1 to read:

1. Electric wiring, outlets and equipment (including lamps) on or attached to stanchions, rostrums or docks which are located or likely to be located in a hazardous area as defined in sub-paragraph b.3 of this section shall conform to the requirements for Class I, Division 2 locations.

Change Section 5115-f-2 to read:

2. Where stanchions, rostrums, or

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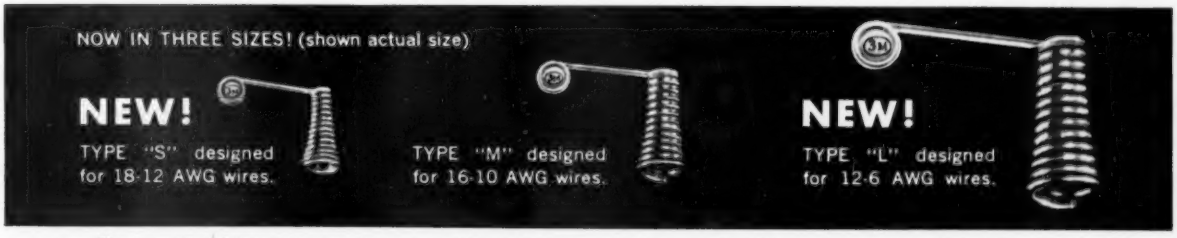

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docks are not located or likely to be located in a hazardous area as defined in sub-paragraph b.3, wiring and equipment shall conform to paragraphs d and e of this section, except that such wiring and equipment not more than 18 inches above the floor in any position shall conform to sub-paragraph f.1. Receptacles and attachment plugs shall be of locking type which will not break apart readily.

Change Section 5115-f-3 to read:

3. Mobile stanchions with electrical equipment conforming to sub-paragraph f.2, shall carry at least one permanently affixed warning sign to read: "WARNING—KEEP 5 FEET CLEAR OF AIRCRAFT ENGINES AND FUEL TANK AREAS."

Change Section 5115-i-2 to read:

2. Battery chargers and their control equipment shall not be located or operated within any of the hazardous areas defined in paragraph b of this section, and should preferably be located in a separate building or in an area such as described in sub-paragraph b.4. Mobile chargers shall carry at least one permanently affixed warning sign to read: "WARNING—KEEP 5 FEET CLEAR OF AIRCRAFT ENGINES AND FUEL TANK AREAS." Tables, racks, trays, and wiring shall not be located within a hazardous area, and shall, in addition, conform to the provisions of Article 480.

Change Section 5115-j-1 to read:

1. Aircraft energizers shall be so designed and mounted that all electrical equipment and fixed wiring will be at least 18 inches above floor level and shall not be operated in a hazardous area as defined in sub-paragraph b.3.

Change Section 5115-j-2 to read:

2. Mobile energizers shall carry at least one permanently affixed warning sign to read: "WARNING—KEEP 5 FEET CLEAR OF AIRCRAFT ENGINES AND FUEL TANK AREAS."

Change Section 5115-j-3 to read:

3. Aircraft energizers should be equipped with polarized external power plugs and should have automatic controls to isolate the ground power unit electrically from the aircraft in case excessive voltage is generated by the ground power unit.

Change Section 5115-k-1 to read:

1. Mobile servicing equipment (such as vacuum cleaners, air compressors, air movers, etc.) having electrical wiring and equipment not suitable for Class I, Division 2 locations shall be so designed and mounted that all such fixed wiring and equipment will be at least 18 inches above the floor. Such mobile equipment shall not be operated within the hazardous areas defined in sub-paragraph b.3 of this section and shall carry at least one permanently affixed warning sign to read: "WARNING—KEEP 5 FEET CLEAR OF AIRCRAFT ENGINES AND FUEL TANK AREAS."

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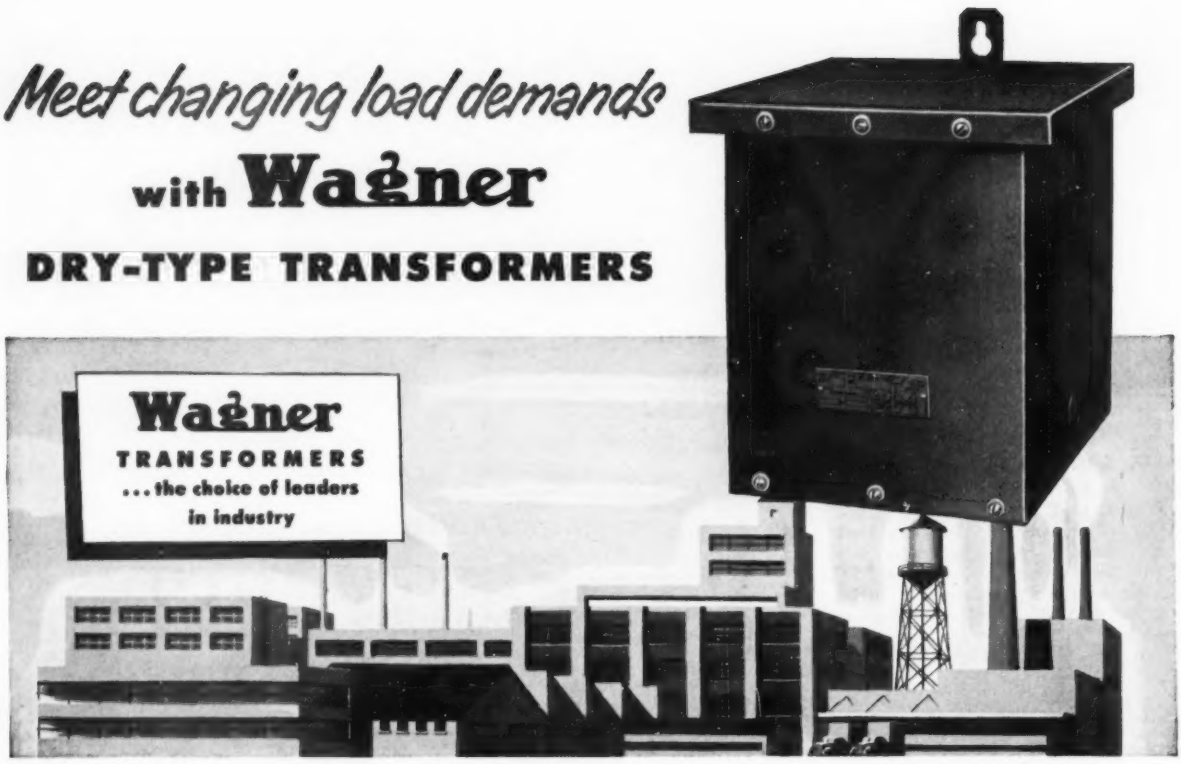

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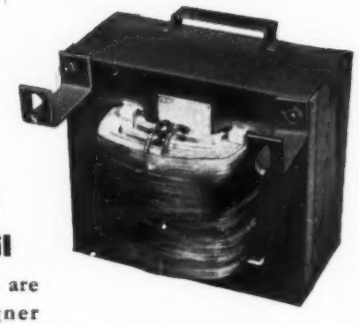

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Since the invoice is presented to the customer upon delivery of the repaired piece of equipment, and since receipt is attested by the signature of the person accepting the delivery, the multiple invoices eventually serve as records, work-sheets and bills.

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We guarantee only the parts we replace, and the labor we perform, for 1 year from date of delivery. Our guarantee does not cover failure due to lack of lubrication, tight belts, low voltage, faulty controls, overload, defective machinery, or other causes beyond our control. In any event, our liability will be limited to the original value of work done. In the event of failure under guarantee, unit must be brought to our shop free of any charges whatsoever, as we will not be responsible for work done, or charges incurred, by anyone other than ourselves.

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A combination cardex file and drawer type of cabinet is being used by Albertson & Son, Philadelphia, in maintaining a perpetual inventory record of all the commutators that are stocked and in making them easily available when needed.

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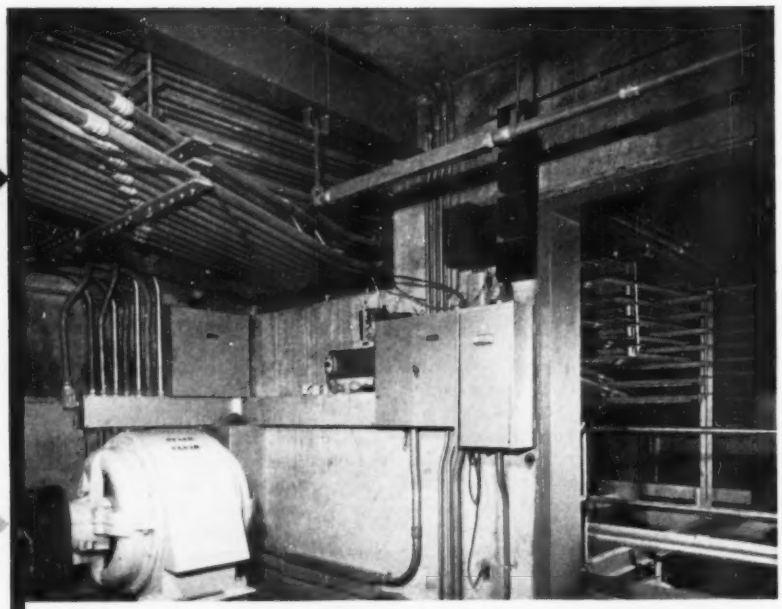

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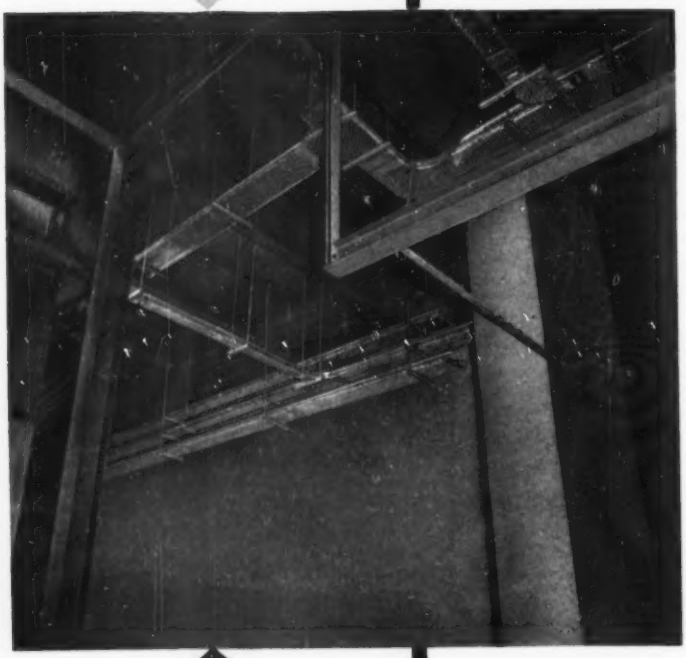

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You, too, can make such savings.

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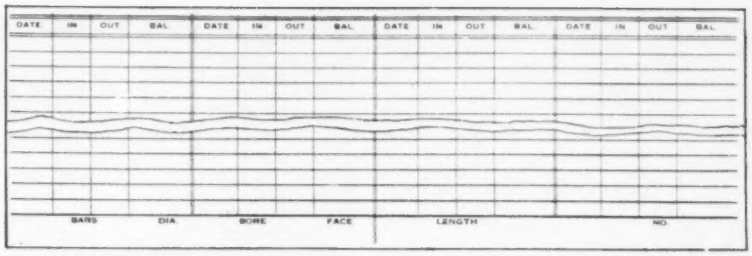
A detailed bulletin giving all the facts about Cope Cable Trough will be sent upon request. Write for it.

You know Cope by these products

711 SOUTH 50th ST. • PHILADELPHIA 43 • PA.



INVENTORY CARD is used for each type and size commutator, and has space for date and quantity of each "in" or "out" transaction, and a perpetual "balance" on hand.

In this way the firm has a running account of the number of commutators of each type, as shown by each card.

Albertson knows what his base level should be for each type of commutator and when he sees his inventory balance running to that figure, he immediately re-orders. He checks his cards weekly. This is simply done by flipping them, as the cardex type of filing system makes this operation simple.

A drawer type stock bin is used to stock the commutators. Each drawer is divided into four sections with dividers, and each section is numbered. On the drawer are the four numbers of the commutator stocked within it. These numbers correspond with the numbers on the cards in the visible file system.

Thus if an employee has to withdraw a certain type and size commutator from stock, he looks it up on the card in the file and gets the number given it. He then makes his withdrawal from the drawer, makes entry on card.

CARDEX FILE is used by Al Albertson, of Albertson & Son motor repair shop, Philadelphia, to maintain a perpetual inventory record on all commutators.

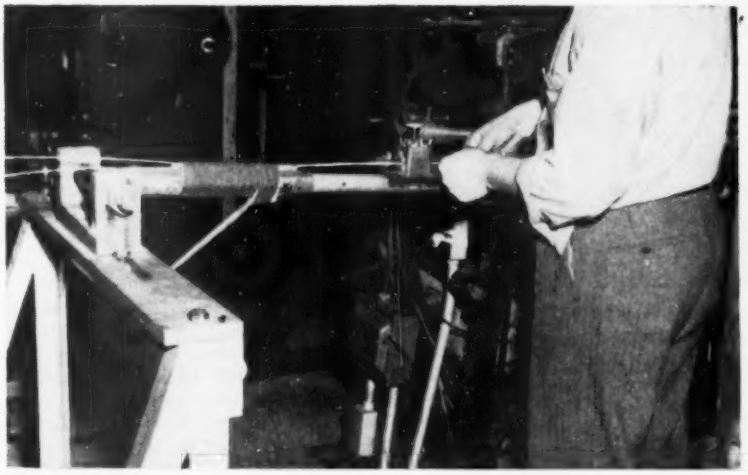
Adjustable Rack Insures Reel-Winder Alignment

A fixture for lining up wire between spools and winding head has been constructed in the electric motor repair shop of George Lockwood, Trenton, N. J. This rack prevents snags, eliminates over-running and generally speeds the coil-winding operation.

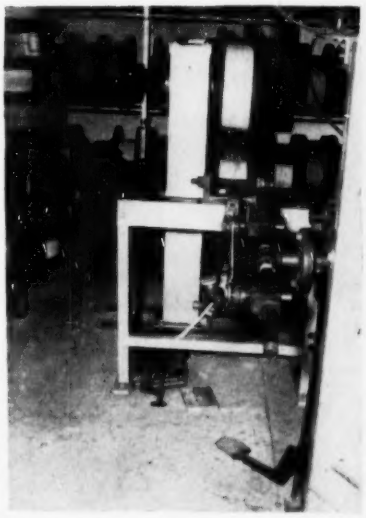
Heart of the device is an adjustable T-shaped pipe bracket, supported by a bedplate mounted across the tops of two steel A-frames. A slot in the bedplate permits lateral movement of the pipe, permitting accurate alignment with the winding machine.

At one end of the 3-foot T-section, small diameter tubes have been taped to guide wires coming from the reels while, at the other end of the arm, a 6-channel tension and guide device has been welded. Similar in construction to a small clamp, the tension device is pressure-regulated by thumb screw.

The small tubes prevent snags between the reels and the coil being wound, while the tension device eliminates over-running of the spools. Further manipulation after initial adjustment is unnecessary.



SLOTTED BEDPLATE, mounted on steel A-frames, permits lateral movement of pipe-formed wire guide and insures accurate alignment of wire reels with winding machine.



CABLE SLOTS and tension device prevents snags or the over-running of unreeling wire spools.

Convenient Storage In Waste Space

The space beneath stairways is generally either wasted or is a potential firetrap wherein an assortment of old or useless odds and ends are collected. That this condition is unnecessary is evidenced by a series of handy bins constructed in such locations in the

WOODEN BINS constructed beneath stairway is handy way of storing short lengths of pipe, rod, wire and insulation material. This arrangement provides a means of practically combining formerly-wasted space, lumber and materials.

Central Armature Works of Washington, D. C. The bins were made from lumber originally used in crates, so the investment in materials was nil.

These bins serve a useful purpose, for they now hold a miscellaneous assortment of short pipe lengths, steel rods, fittings, left-over lengths of wire, sleeving and the like. Many of these items were formerly discarded, yet they now are used for odd jobs, making it unnecessary to cut into longer lengths of stock items and thereby contributing to the economical disposal of formerly-wasted material. The result—combining generally-considered waste space, waste lumber and waste sections of material—has the approval of management and labor alike.

Cleaning of the bins is easily accomplished without removing the items stored therein by inserting a flexible hose attached to a vacuum cleaner.

Sandblast Chamber Has Many Useful Features

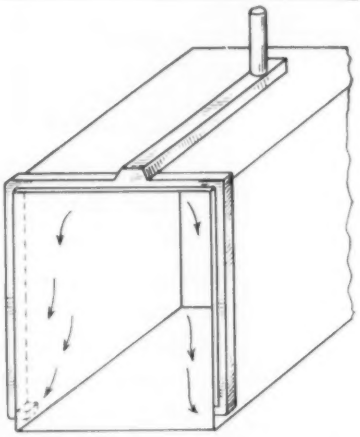
The Pangborn walk-in sand-blast chamber used by the Pennsylvania Electric Coil Corporation of Pittsburgh has numerous features for the promotion of efficiency, safety and health. Among these are vapor-proof lights, cone-shaped exhaust vents, an open grid steel flooring, salvage hopper, high-velocity blasting hose and compressed air system, sturdy turntable and roller dolly for the support of equipments being finished.

Dust derived from sand particles, rust, old paint or lacquer is sucked away from the working area instantly by the exhaust cones, which point downwards with the intake vents at the apex positions. Heavier air-borne par-

INVERTED CONES contain exhaust vents at apex points, deflect flying sand particles to perforated flooring and under-floor reclamation bin. Turntable, adequate lighting and protective clothing insure ease, accuracy and safety of worker.

ticles of sand are deflected by the sides of the cones and drop through the perforated floor panels into the salvage hopper for recirculation through the compression chamber and blast hose. The large diameter (2 inches) of the hose nozzle insures uniform coverage of a large surface, minimizes pitting of local points and promoting complete coverage of the object being blasted.

Workers in this chamber wear coveralls, gauntlets and helmet equipped with a face-covering visor and breathing filter. Full freedom of movement is thereby possible, while illumination and working facilities are excellent.



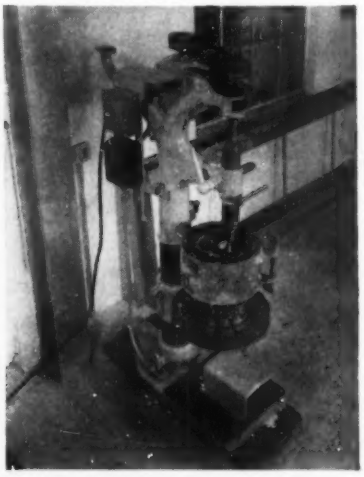
EXTERIOR DUCT exhausts fumes from this 5 ft. by 5 ft. by 6 ft. bake oven in the motor repair shop of the Owen Gollar Electric Company in Louisville, Kentucky. Two 2 in. by 8 in. riser ducts enter the sides of the metal oven enclosure 3 inches from the floor and 6 inches in from the door, join a 4 in. by 8 in. duct on top of the oven which carries the fumes to a natural draft stack at the rear.

Converted Drill Press Cuts Coil Extensions

For cutting coil knuckle extensions of rewound stators at the Lockwood Electric Motor Service, Trenton, N. J., a drill press has been "pressed" into service. Formerly the job had to be done with a pair of cutting pliers—a time and labor-consuming chore.

For holding the frame and stator firmly in place, a special circular jig was constructed on the press, and a flat high-speed circular saw is worked around the coil knuckles to cut them off.

It is important to note that the circular blade has scalloped teeth rather than conventional saw teeth, for saw teeth would tend to catch the wire and either rip or tear it out of place. The scalloped edges cut into the knuckles with ease, making a neat cut-off job.



DRILL PRESS is fitted with a circular scalloped-tooth cutter and a jig for holding frame and stator in cutting position.

CUTTING WHEEL is lowered and accurately positioned inside the stator for cutting operation.

Remember EDWARDS...

and forget your installation worries!

Edwards equipment is designed with the contractor in mind. Ease of installation saves valuable man hours. Precision engineering provides rugged, trouble-free operation with minimum of servicing and maintenance.

You build both profit and prestige when you install "Edwards" quality equipment.

ADAPTABEL

The most popular heavy duty bell . . . has clear tone with exceptional carrying power. By actual test the Edwards Adaptabel is 140% louder than any other bell of equivalent size. Listed by Underwriters' Laboratories. Available in 4", 6", 10" sizes.

size	Loudness Factor decibels*	loudness units
4 inch	77	13,500
6 inch	83	21,400
10 inch	89	35,000

*at ten feet

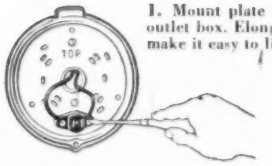
ADAPTAHORN

Where maximum loudness is required . . . especially over unusual noise conditions, the Edwards Adaptahorn never misses. Loud or muted this is one horn that keeps its adjustment . . . never changes once it's set. Listed by Underwriters' Laboratories.

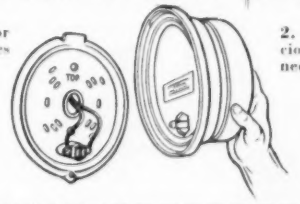
type	Loudness Factor decibels*	loudness units
flush	94	52,000
projector	91	40,000
grille	98	80,000

*at ten feet

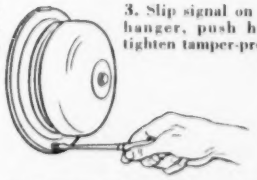
UNIVERSAL MOUNTING PLATE FITS BOTH ADAPTABEL AND ADAPTAHORN



1. Mount plate on wall or outlet box. Elongated holes make it easy to line up.



2. Pull wire through spacious center hole and connect to large binding posts.

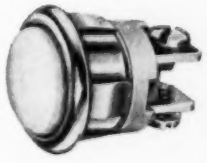


3. Slip signal on to sturdy hanger, push home and tighten tamper-proof screw.

EASI-MOUNT TRANSFORMER

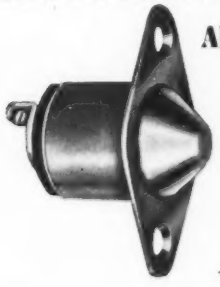
For easy and speedy installation the Easi-Mount is unsurpassed. Mounts to any half-inch knockout with expandable nipple, adjustable by an outside set-screw. Can also be surface mounted. For door bells and chimes.

LOW VOLTAGE PUSH BUTTON



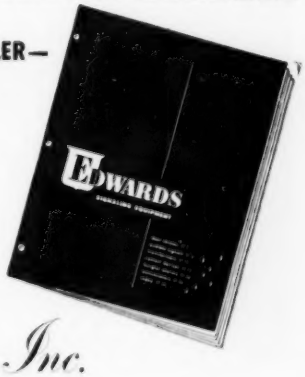
On quality and performance, Edwards famous "No. 620" has rightfully earned its distinction of being the world's most widely used flush push button. Has positive, self-cleaning contacts. Mounts in 7/8" hole with spring clips.

ALL PURPOSE CONTACTOR



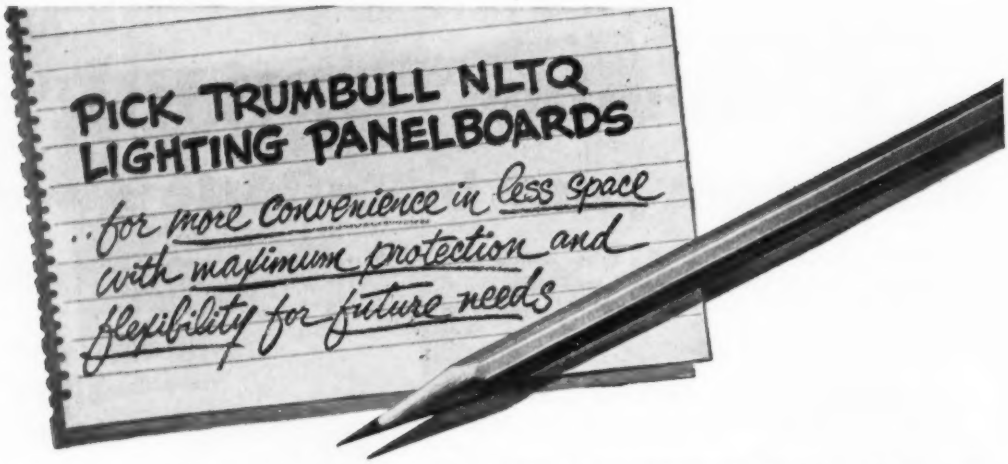
ALL PURPOSE to make or open contact on doors, windows, transoms, safes, burglar alarm systems, as foot push, automatic machinery, etc., operates from pressure in any direction. Made of brass, fits 3/4" hole. For low voltage.

ASK YOUR WHOLESALER— OR WRITE FOR NEW ILLUSTRATED STAPLES BULLETIN

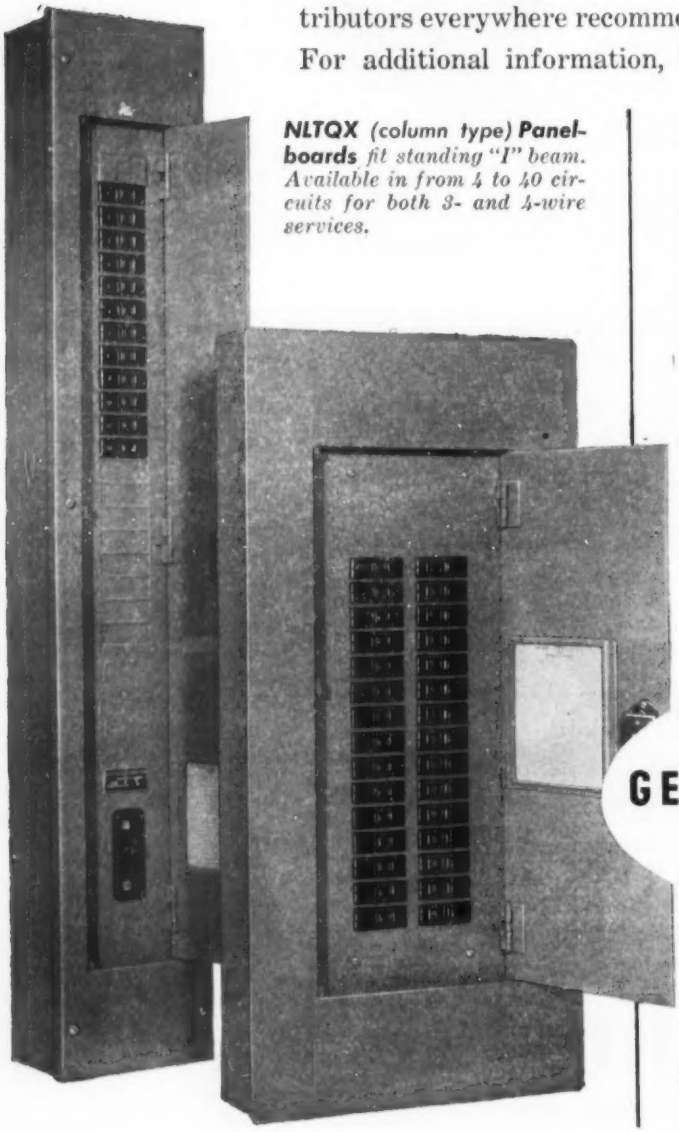


EDWARDS *Company, Inc.*

Dept. E.C. 10, NORWALK, CONN. In Canada: Edwards of Canada, Ltd.



Trumbull's fifty-year leadership in panelboards has never been more in evidence than in its NLTQ line. Leading electrical distributors everywhere recommend them and carry complete stocks. For additional information, let us mail you Bulletin TEB-14.



***NLTQX** (column type) **Panelboards** fit standing "I" beam. Available in from 4 to 40 circuits for both 3- and 4-wire services.*

3 WAYS BETTER...

1. Circuit breaker convenience and protection. Type TQL. Quick-make, quick-break. Thermal-magnetic trip, arc-quenching design and trip-free action for top protection. Convenient plug-in design and manual re-set. Equally important, it has a separate trip indicating position.

2. Strong compact interiors readily removable for fast installation. Busbars molded in plastisol, and braced against damage from current surges. Run cooler than in open air.

3. Compact boxes, protected fronts. Adequate knockouts and gutters. Front integral with barrier. Breaker knockouts in front panel to provide for future circuits.

GENERAL ELECTRIC

DISTRIBUTION ASSEMBLIES DEPARTMENT
PLAINVILLE, CONN.

***NLTQ Panelboards** available in from 4 to 42 circuits for both 3-wire and 4-wire services with lugs only or Trumbull 50 to 225 ampere breakers in the mains, and TQL 120 volt, 10 to 50 ampere circuit breakers on branches. AC only. Underwriters' Laboratories, Inc. listed.*

In The News

D. C. McGraw Elected President of McGraw-Hill

Donald C. McGraw was elected president of the McGraw-Hill Publishing Company, Inc. at a meeting of the Board of Directors last month. He succeeds his brother, the late Curtis W. McGraw.

Mr. McGraw, youngest son of the late James H. McGraw, Sr., founder, has been associated with the company since 1919. He has been a director since 1935, and vice president since 1945. During World War II, he was a consultant to the Publishing and Printing Division of the War Production Board.

Mr. McGraw joined McGraw-Hill in 1919 as a member of the advertising staff of Chemical and Metallurgical Engineering, which has since become Chemical Engineering. Two years later, he transferred to the pressroom and composing room. In 1924, he assumed supervision of the operation of the building and of the printshop.

Since 1933, when he was made secretary of the company and put in charge of production and manufacturing, he has been responsible for the handling of all contracts for printing and binding, engraving, and paper supply for the entire McGraw-Hill operation.

Mr. McGraw in 1945 was named vice president for Manufacturing and General Services, the position he has held until now. In 1950, he became a director of the McGraw-Hill Book Company, a McGraw-Hill subsidiary, and of the Newton Falls Paper Mill in which McGraw-Hill has a half-interest.

Other officers of the Company continue unchanged.

Inspectors Celebrate Silver Jubilee in Chicago

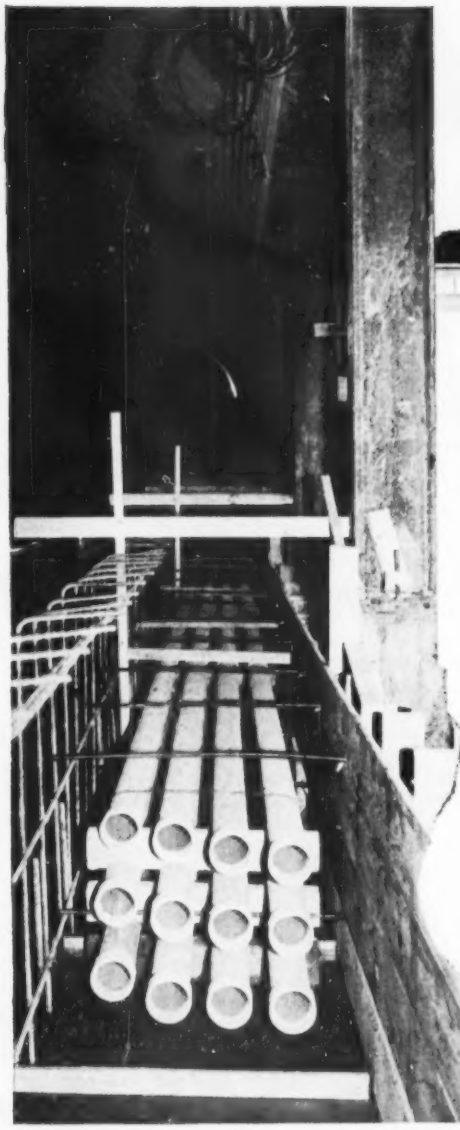
First all-section IAEI conference since early 1930's draws record attendance to 5-day electrical safety meeting. Comprehensive forum agenda and exceptional trade show highlight quarter-century of progress.

Probably never before at a single conference has the national importance of electrical safety and the vital role of the electrical inspector been more clearly defined than at the Silver Jubilee meeting of the International Association of Electrical Inspectors last month. Approximately 1,300 members and guests from all sections of the U. S., Canada and Hawaii converged on Chicago's Edgewater Beach Hotel on Sept. 21st for a week-long forum.

In contrast to the normal pattern of five annual section meetings, this all-section conference was planned to celebrate the 25th Anniversary of the founding of IAEI—a quarter-century of progress in electrical safety and inspection. The safety theme permeated the general session agenda and the exceptional electrical product display that was an integral part of the meeting. Coincidentally, the first copies of the 1953 edition of the National Electrical Code were available to provide a wealth of discussion material at early morning and afternoon informal Code panel forums. The 400-plus page manual of concise regulations designed as a minimum safety standard presented a sharp contrast to the earlier Codes (first NEC developed in 1892) on display in the meeting room.

Those fortunate enough to attend all sessions received a broad concept of the intra-industry cooperation which led to the progressive development of the present Code. Percy Bugbee, general manager, National Fire Protection Association, Boston, reviewed NFPA's role since it took over jurisdiction of the NEC in 1911; commended IAEI members for their excellent work on the development of Code regulations and revisions. Since no regulations can be effective without public acceptance, Mr. Bugbee suggested mass education through wider participation by IAEI members in fire prevention

CANADIAN SECTION CHARTER presentation highlighted the opening convention session. Canadian inspector officers N. A. Cockburn (left), section secretary and Rene LaBelle, president, accept document from IAEI secretary C. L. Smith and International president W. A. Stall.



Incombustible...

That's why TRANSITE® DUCTS confine burn-outs and protect adjacent cables

DESPITE modern precautions, the burn-out is still a potential hazard. Consequently, cables should be given the maximum fireproof protection that Transite Ducts provide.

Transite Ducts confine burn-outs, safeguard adjacent cables from damage and reduce the possibilities of panic and explosion because they are incombustible throughout. Made of nonflammable asbestos and cement, Transite Ducts will not burn, smoulder or generate smoke or fumes. They cannot contribute to the formation of explosive gases.

Nowhere is the fireproof protection of Transite Ducts so necessary as in such vital locations as subways, tunnels and power plants.

As the panel below shows, incombustibility is only one of the advantages of Transite Ducts. For more information, write Johns-Manville, Box 60, New York 16, N. Y.

4 OTHER REASONS WHY TRANSITE DUCTS DO A BETTER JOB AT LESS COST:

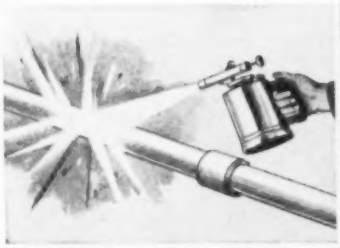
1. Corrosion-Resistant. Transite, being made of inorganic asbestos and cement, resists corrosion and is immune to electrolysis.

2. Permanently Smooth Bore. Transite makes long cable pulls easy. Danger of damage to cables is also minimized.

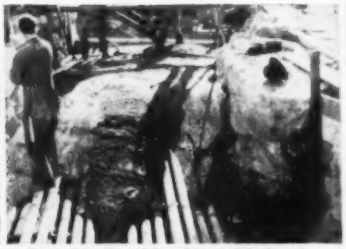
3. Easy To Install. Transite Ducts are light weight, easy to handle. Joints are quickly made. And long 10-ft. lengths reduce the number of joints in line.

4. High Thermal Conductivity. Cables run cooler in Transite, reducing I^2R losses, increasing current capacity and prolonging insulation life.

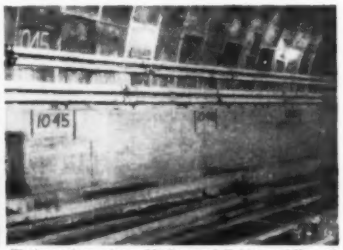
In Subways, where passenger safety is paramount, fireproof Transite Ducts will, in the event of a burn-out, confine it and reduce the hazard of panic.



Transite Does Not Burn, smoke or fume because its ingredients, asbestos and cement, will not support combustion. It cannot contribute to the formation of explosive gases.



Transite Provides Heat Dissipation, Too. In addition to providing fireproof construction, Transite Ducts permit cables to run cooler, reducing I^2R losses.



Photograph courtesy of Triborough Bridge and Tunnel.

In Vehicular Tunnels, if a burn-out should occur, Transite Ducts limit damage, permit speedier repair and an earlier re-opening for traffic.

JOHNS-MANVILLE JM PRODUCTS

Johns-Manville TRANSITE DUCTS

TRANSITE KORDUCT—for installation in concrete

TRANSITE CONDUIT—for exposed work and installation underground without a concrete encasement

activities at the local level. He believes an Electrical Week can enjoy the same public acceptance now accorded Fire Prevention Week. Fire prevention engineering is rapidly gaining professional status, he stated and revealed the recent organization of a Society of Fire Protection Engineers with a membership of 1,000.

Some technical aspects of national standards were discussed by R. S. Moulton, NFPA technical secretary. He used the Advisory Standards for Hospital Operating Rooms as an example and listed several more. To those interested in the electrical aspects of other standards, he recommended the cloth-bound edition of the NEC which contains electrical excerpts from other NFPA manuals.

Mass education and electrical week promotion were explored further by A. H. Welklin, Ft. Wayne, Ind., chairman, IAEI Public Relations Committee; and J. A. Riopelle, electrical inspector, Detroit. Using newspaper articles published in his own city covering electrical fires and hazards (on display at the convention), Mr. Welklin told the assembled inspectors that effective publicity can be obtained. A camera, to record hazardous conditions and illustrate articles, should be as important a part of the electrical inspector's equipment as his flashlight, he added. Electrical inspection without an educational program is a job only half done, he warned. Mr. Welklin urged that the IAEI accept the challenge of the Washington and Michigan Chapters to plan a National Electrical Week.

More than 500,000 "Home Inspection Report" electrical check-off sheets were distributed throughout Michigan during Electrical Week, Mr. Riopelle revealed. More than half went to students in schools so that children and their parents would become conscious of electrical safety in everyday living. This inspector assignment was supplemented by some 60 radio and TV announcements, newspaper articles, speakers programs and film presentations sponsored by the Electrical Association of Detroit. Mr. Riopelle's recommendation that a National Electrical Week be established was immediately followed by a resolution suggesting that IAEI sponsor such a promotion.

Uniform Inspection

Uniformity and standardization were terms heard frequently during the meeting. W. J. Donald, manager, National Electrical Manufacturers Association, New York, recounted the manufacturers' contribution to electrical safety through continuous research and development of better products (to the tune of 10% of gross income); provision of application and performance data; and the development of NEMA Standards. These voluntary standards define equipment ratings, construction, safety and operating characteristics, performance, test procedures and recommended service. The NEC represents the best balanced judgment based on cooperative efforts of all segments of the electrical industry, he noted. Reasonable electrical safety approaches the absolute with progress in techniques and materials —and still higher safety levels can be expected in the future. Mr. Donald concluded.

FROM THE NORTHWEST came: (L to R) J. H. Stayner, Utah Power & Light Co., Salt Lake City; W. L. Gaffney, chief electrical inspector, Tacoma, Wash.; J. C. Hewitt, chief electrical inspector, State of Washington, Olympia; and R. E. Crosby, Washington Water Power Co., Spokane.

The electric utility industry is definitely for uniform inspection and uniform interpretation of Code regulations in the field, the inspectors were told by M. E. Skinner, vice president, Union Electric Co., St. Louis. With average residential consumption in his company increasing 54% over the past five years, it is important for the utilities to work toward maximum quantity of outlets while maintaining minimum safety standards, he revealed. Unless a wiring system is adequate in the beginning, subsequent extension with improvised materials and techniques can lead to hazardous conditions, he warned. Mr. Skinner compared the responsibility of inspector and utility to the public and the similarity of their common goals. He feels that the machinery to keep the Code abreast of technical progress in the industry fulfills the requirements and deplores efforts at local levels to substitute other criteria for wiring inspection or formulation of necessary regulations.

The electrical contractors, too, are solidly behind uniform inspection and uniform interpretation of Code regulations, according to E. R. Cornish, director of research, National Electrical Contractors Association. More than that, NECA wants to make certain, through adequate licensing ordnances, that competent, qualified contractors and electricians install electrical work. There are just not enough electrical inspectors employed to check minute details of installations and ferret out hazards due to improper workmanship, he continued, noting that adequate licensing would help solve this problem. NECA Chapters also are working toward establishment of proper standards for qualification of electrical inspectors and the establishment of proper salary schedules commensurate with the duties and responsibilities of electrical inspectors, Cornish revealed. NECA is also committed, by resolution, to stop the practice of some local inspection departments to approve only Underwriters labeled material and equipment. Since the NEC does not insist upon a UL label, and since some contractors have equipment custom built with equipment from manufacturers not subscribing to the label service, NECA considers this practice unfair and monopolistic. While contractors support a reasonable and practical "plan-check" system of many electrical inspection departments, they are against the practice of requiring such plans to be signed by a registered engineer, Cornish noted in discussing contractor-inspector relations.

Organized labor and electrical inspectors have a common goal—desire for good wages, working conditions, security and better service to the public through protection to life and property, W. W. Robbins, research director, International Brotherhood of Electrical Workers, told the convention.

A highly interesting report on electrical construction operations in Europe was presented by George Andrae, Milwaukee electrical contractor, who was a member of a NECA committee touring Europe on a goodwill mission. Mr. Andrae visited London, Stockholm, Zurich, Rome and Paris. Among his many observations were these:

Much open wiring, mostly 4-wire, 120-volt, 50-cycle current. No apparent

attempt at standardization of equipment with interchangeable features as in the U. S.

Practically no metal conduit is used in Rome. Polyethelene tubing embedded in plaster or concrete form raceways for plastic insulated wires sized according to cross-sectional area. No plug fuses in evidence, but cartridge fused with a plug-in type base. Top grade electricians in Rome get 40 cents per hour (compared to 50 cents for a glass of orange juice for tourists). In London, top grade electricians are paid 80 cents per hour.

Business Sessions

Sandwiched between general sessions and the numerous convention activities were the business sessions of the individual sections. Each group had its own headquarters room in which to transact business normally taken care of at Sectional meetings. Election of officers held top priority at these group conferences. Final tabulation of slates and balloting revealed the following choice for the respective sections:

Western Section—President—C. M. Park, Chicago, Ill.; first vice president—J. E. Fisher, Elkhart, Ind.; second vice president, Glenn Rowell, Minneapolis, Minn.; secretary-treasurer—H. L. Parks, Charleston, W. Virginia. Retiring president is John C. Denner, Saginaw, Michigan.

Eastern Section—President—F. L. Mattfeld, Long Island, N. Y.; first vice president—A. O. Hyde, Buffalo, N. Y.; second vice president—William Carroll, Brockton, Mass.; secretary-treasurer—John W. King, Providence, R. I. Martin C. O'Rourke of Waterbury, Conn., is the retiring president of the Eastern Section.

Southern Section—President—J. E. Snakenberg, New Orleans, La.; first vice president—R. B. Boyd, Jr., Raleigh, N. C.; second vice president—John C. Steele, St. Angelo, Texas; secretary-treasurer—A. M. Miller, Richmond, Va.; assistant secretary—J. Clifton Young, New Orleans. Retiring president of the Southern Section is R. E. Ward of Kenton, Tennessee.

Northwestern Section—President—J. R. Crawford, Butte, Montana; first vice president—J. C. Hewitt, Olympia, Washington; second vice president—Cliff Atkins, Portland, Oregon; secretary-treasurer—W. L. Gaffney, Tacoma, Washington. R. C. Young retires as president of this section.

Southwestern Section—President—E. E. Carlton, Menlo Park, Calif.; first vice president—Ben. H. Wheater, Long Beach, Calif.; second vice president—James L. Ambrosi, Oakland, Calif.; secretary-treasurer—L. E. LaFehr, Alhambra, California. Mr. LaFehr retired this year as president of this group.

PERCY BUGBEE, general manager, NFPA, Boston, urged IAEI members to participate more actively in local fire prevention programs.

Canadian Section—President—René LaBelle, Montreal; first vice president—J. A. B. Kembry, Edmonton; second vice president—L. Robson, Vancouver, B. C.; third vice president—W. J. Brake, Regina, Saskatchewan; fourth vice president—W. D. Smith, Toronto; secretary—K. Bellamy, Toronto; treasurer—N. A. Cockburn, Toronto. This newly created section received its charter at the Jubilee meeting.

International Officers

At the conclusion of the Jubilee meeting, members of the IAEI Executive Council met in a closed session under the chairmanship of international president W. A. Stall. Among the important items on the Council agenda was the election of new international officers whose term of office begins January 1, 1954.

The Council chose B. A. McDonald of Rochester, N. Y. to be the new international president of IAEI. Mr. McDonald is actively engaged in electrical inspection activities for the New York Board of Fire Underwriters and is a consulting editor for *Electrical Construction and Maintenance*.

Other international officers are: First vice president—S. R. Todd, Chicago, Ill.; second vice president—H. G. Ufer, Los Angeles, Calif.; third vice president—E. B. Morrison, Portland, Oregon; fourth vice president—Dewey L. Johnson, Atlanta, Ga.; secretary-treasurer—C. L. Smith, Chicago, Ill. A fifth vice president will be added to the official roster when the newly chartered Canadian Section indicates its candidate. René LaBelle, Canadian Section president, represented his group at the Council session.

1953 IES Annual Lighting Conference

More than 1000 illuminating engineers and lighting authorities attended the 1953 annual National Technical Conference of the Illuminating Engineering Society, held in New York City September 14-17 at the Hotel Commodore. Members from every state in the United States, and from Canada and several foreign countries, registered for this four-day conference for a series of general and specialized sessions on many phases of lighting.

Highlights of this 45th annual Conference included two guest speakers, a lighting progress report, the final runoff of a national lighting competition, a special session on residential lighting, an opening general session, and seven technical sessions at which 27 technical papers were presented.

Guest speaker for the opening general session was Walter H. Sammis, EEI president, and president of the Ohio Edison Company. He cited the rapid rise in the use of electric power for lighting, and predicted that consumption of electric power for lighting purposes will nearly double in the next ten years, reaching a figure of about 186 billion kilowatt-hours that year as compared with something less than 100 billion kwhrs annually at the present time. He also outlined plans for celebration of Light's Diamond Jubilee next year, which will attract increased attention to the significance of lighting, he said.

A. H. Manwaring, IES president-elect, and executive vice-president of Philadelphia Electrical & Manufacturing Co., outlined the major research projects being undertaken by the Society's autonomous IES Research Fund. He also stressed the need for new active members for technical committee work, and praised the "work horses", who have carried on this work in the past.

Everett M. Strong, IES president, and professor of electrical engineering at Cornell University reported on the Society's recent growth and activities at the first session. He also pointed out that the whole area of electric power, including the lighting field, is not attracting the interest of college students in quantities commensurate with manpower needs. He attributed this lack of interest to accumulated neglect by industrial interests and the impact of military service.

Twelve members of IES who were recently elected to the Society's highest grade of Fellow, were presented at the opening general session by President Strong. They were: G. W. Beals, The Miller Co., Meriden, Conn.; Ralph M. Evans, Eastman Kodak Co., Rochester,

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J. A. RIOPELLE, electrical inspector, Detroit, recounts success of Michigan's Electrical Week. Following his talk, the convention resolved to sponsor a National Electrical Week.

N. Y.; Glenn A. Fry, Ohio State University, Columbus, Ohio; Sylvester K. Guth, General Electric Co., Cleveland; W. H. Kahler, Westinghouse Electric Corp., Cleveland; H. J. Cory Pearson, Civil Aeronautics Administration, Indianapolis, Ind.; Wentworth M. Potter, General Electric Co., Cleveland; Ernest H. Salter, Electrical Testing Laboratories, Inc., New York; George E. Shoemaker, Philadelphia Electric Co., Philadelphia; George J. Taylor, DayBrite Lighting, Inc., New York; and Carl W. Zersen, Chicago Lighting Institute, Chicago, Ill.

Guest speaker at the first technical session, on Light and Vision, was H. C. Weston, director of the Medical Research Council's Group for Research, University of London. Speaking on "Visual Fatigue as Related to Lighting", he said that new large-screen television, viewed at a distance, is easier on the eyes than small-screen TV.

The annual Lighting Progress Report, a dramatized account of the advances made during the past year in light sources, lighting equipment, and applications, was presented for the IES Lighting Progress Committee by Ted Sargent, Sylvania Electric Products Inc., committee chairman. This demonstration included the showing of nearly 100 new lighting products and techniques.

An outstanding feature of the Conference, and of particular interest to lighting application engineers, was the presentation of the best and most original lighting jobs in the "My Most Interesting Lighting Job" contest. Nine winners at the IES Regional level competed in the final run-off of this contest, sponsored by the Lighting Service Committee.

First prize was won by Merrill Humber, Humber & Walker Co., San Francisco, for his entry on the "Lighting of the Broadway Tunnel" in San Francisco.

Second prize was awarded to Nick Stuffer, Westinghouse Electric Corp., Cleveland, for his entry on "Lighting An Executive Office".

Mario G. Zervigon, Louis N. Goodman and Associates, New Orleans, was awarded third prize for an entry on "Floodlighting the Mississippi State Highway Dept. Office Building" at Batesville, Miss.

Fourth prize was split between Henry J. Koether, Wisconsin Electric Power Co., Milwaukee, for an entry covering "Lighting of a Dress Shop" and L. E. Spears, Pennsylvania Power Co., for his entry on "Lighting of a Jewelry Store".

Other contestants were Benoit C. Doucet, Curtis Lighting of Canada—"Lighting of a Church"; D. E. Frank, Spokane, Wash.—"Lighting a Banking Room" (presented by Walter A. Toly, Columbia Electric & Mfg. Co. as alternate); E. J. Whitlow, McClure Electric Co., Dallas, Texas—"Lighting a TV Tower" (presented by M. J. Myers, Tulsa, Okla., as alternate); R. R. Duncan, Jr., New Bedford Gas & Edison Light Co., Mass.—"Lighting of a Bank Director's Room".

An entire morning session was devoted to "Residence Lighting Forums in Action", and included a speaker from each of the Society's five active Forum groups. Speakers were Virginia Skinner, Long Island Lighting Co., May Love Gale, TVA, Kerr Sanders, Chicago Lighting Institute, Mary Taepke, Detroit Edison Co., and Emily Alexander, Georgia Power Co. Edith Buchholtz, Westinghouse Electric Corp., Forum committee chairman, presided.

Other sessions included: Light Sources and Controls, with five speakers; Lighting Evaluation, with five speakers; Utilization, with three speakers; Street Lighting, five speakers; Measurements, with five speakers; and Daylighting, three speakers.

JOHN C. DENNER, Saginaw, Mich., chief electrical inspector and 1953 president, Western Section, IAEI, agrees with John E. Wise (right), Madison, secretary, Wisconsin Chapter, IAEI, that new 1953 NEC is a job well done.

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Luminous Ceilings Up Contractors Volume

Increasing use of broad-area, diffused lighting in "electrical ceilings" which contain other building components should give the electrical industry, and particularly the electrical contractor, a much larger share of the dollar to be invested in new commercial buildings and in future luminous modernization.

This forecast was made by A. F. Wakefield, President of The F. W. Wakefield Brass Co., Vermilion, Ohio, prior to the Vision, Brightness and Design Conference at the Laboratory of Lighting Design, Department of Architecture, M. I. T., Boston.

Citing a current installation of light-sound-air distribution type of ceiling as an example, he said that in the new engineering building for the El Segundo Division of the Douglas Aircraft Co., Inc., El Segundo, Calif., loud speakers for the plant's public address system, also air diffusers, will be built into the over-all lighting. Sprinkler heads will be located in the acoustical baffles, along with outlets for power, and space for telephone cables. Thus seven services will be combined in one overhead area in this large project designed by Kistner, Wright & Wright, architects and engineers.

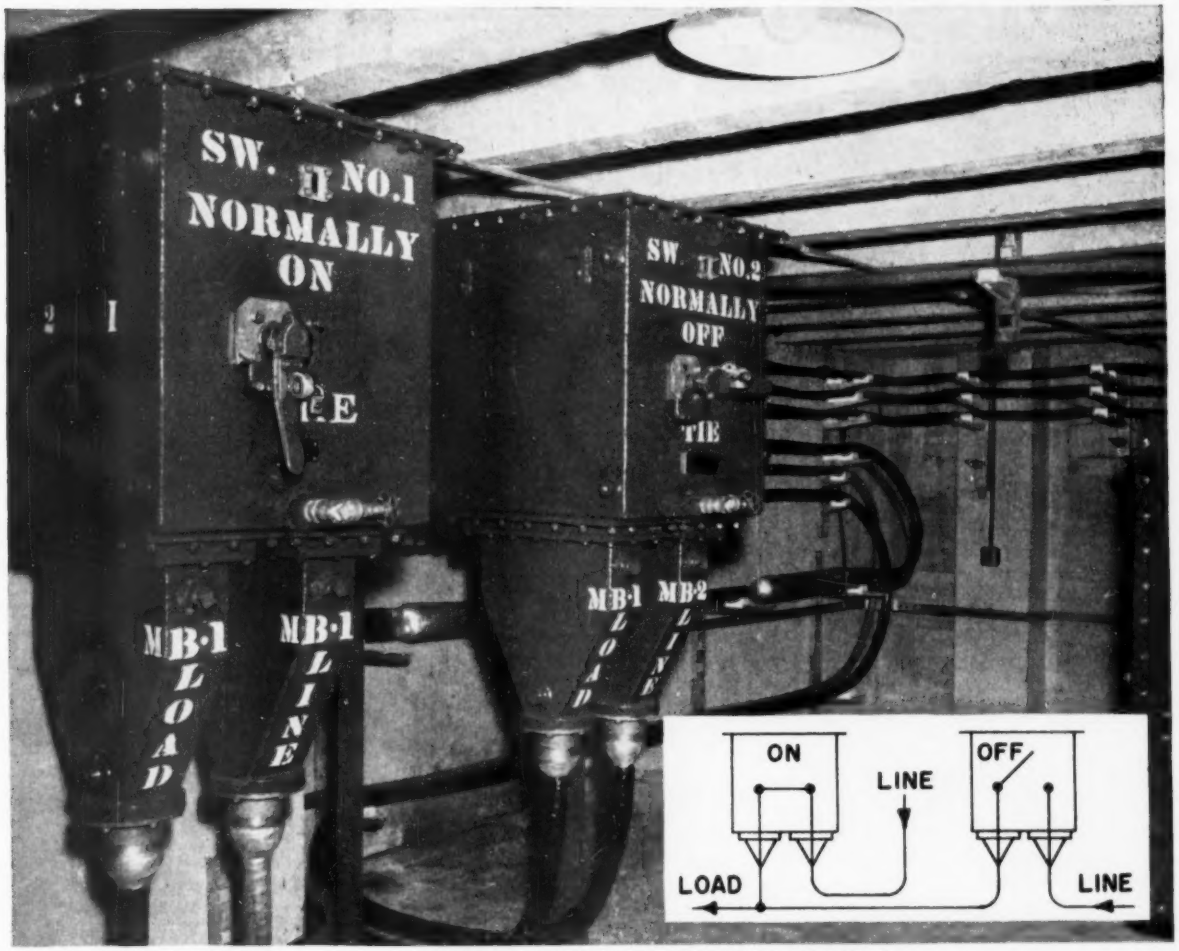
Wakefield pointed out that this full utilization of possibilities inherent in this broad-area lighting system means that the electrical contractor has received a much larger share of the total cost of the building than the 10% which is normal in this type of construction. More than 110,000 sq ft of electrical ceiling will be required to furnish services in rooms up to 210 feet square. The electrical contractor is installing the Wakefield ceiling, the PA system, the circuit wiring in the mold on the bottom of the acoustical baffles, and motors and panel-boards for the distribution system, Wakefield said.

Combining of seven basic but diverse building services into one unit of functional compatibility is a forerunner, in Wakefield's opinion, of what may be expected increasingly in architectural specifications. Similar specifications, he said, can be incorporated into old structures to give them an entirely new look.

His belief is based upon this most recent case history and upon experience since the 1940's when his company pioneered with authorities at M. I. T. in the development of wall-to-wall diffused lighting, including ceiling elements for noise reduction. Later studies by Case Institute of Technology showed that the space between the luminous diffuser and structural ceiling is well suited for air distribution.

G&W TYPE "RA" LOAD BREAK OIL SWITCHES

provide safe sectionalization for cable system FLEXIBILITY



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Send for Bulletin DB51 which gives dimensions and prices on various styles of 2, 3, and 4 way "RA" switches

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TECHNICAL CONFERENCE finds Robert E. Barry (left), president of Robert E. Barry Electric Co., Inc., Louisville, Ky., and estimator-engineer Robert J. Byron checking plans of an active construction project. Barry Electric is one of the members of Kelso-Burnett & Associates, project electrical contractors for the gigantic G. E. Electronics Park near Louisville.

Tangen Heads N. D. Contractor Group

Peder A. Tangen of Pekin, North Dakota was elected president of the North Dakota Electrical Contractors Association at the annual convention held in Minot this summer. Other members of the official family include: vice president—Joseph Schei, Bottineau; secretary-treasurer — L. C. Oeder, Bismark.

The following electrical contractors were elected to the Board of Directors: O. Stenehjem, Williston; A. O. Holmes, Minot; John Nylund; J. I. Shepard, Walhalla; Wes Severson; Valley City; Harold Kivley, Carrington; Wendelin Fisher; F. J. Miller, Dickinson; J. Lambert; Andrew Zidick; C. H. Scheibe, Marion; and H. K. Junge, Sr., West Fargo.

The 1954 convention will be held at Devils Lake, North Dakota, with Mr. and Mrs. Vern Dickinson in charge of arrangements for the host city.

NISA News

Quaker City held their meeting on September 9th at Beck's-On-The-Boulevard. Bill (G.W.) Swartzbaugh of Dow-Corning Corporation presented a timely talk on Silicones and their application. Some time was contributed to the discussion of the pros and cons of the new Pennsylvania Sales and Use Tax.

Officers of Chapter are: President—Sam Augustine, Vice Pres.—Milt

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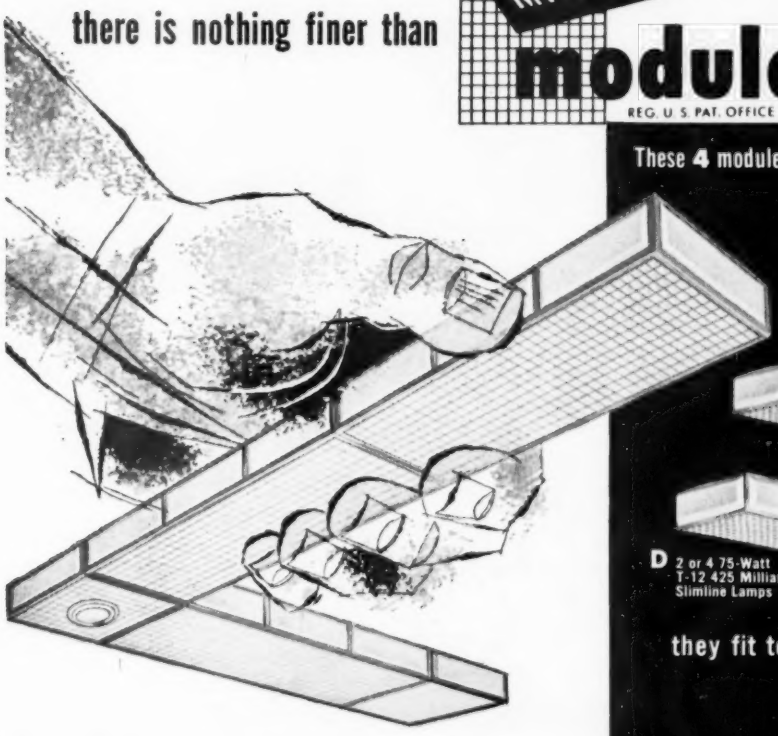
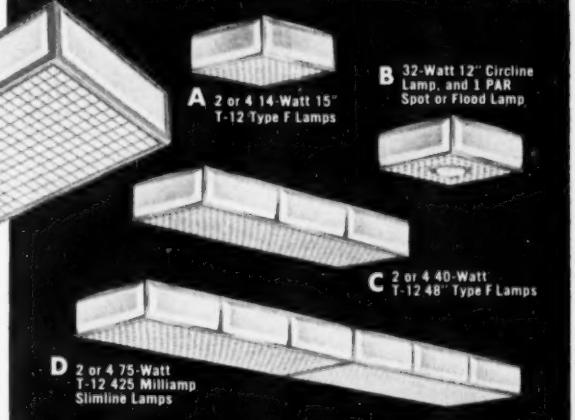
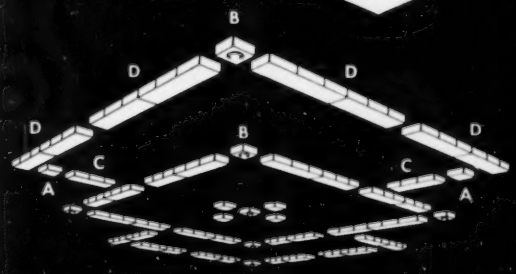


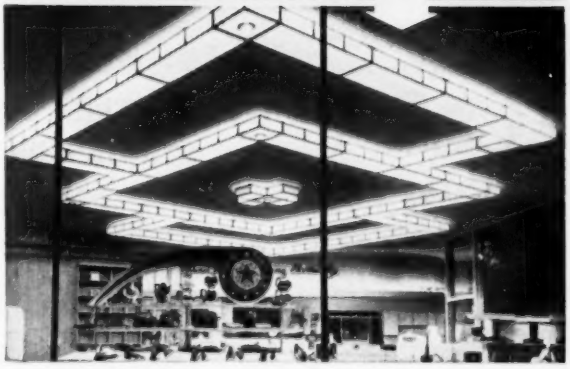
These **4** modules are the "BUILDING BLOCKS" of light



they fit together like this



for lighting magic like this



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20% MORE LIGHT

When you specify MITCHELL MODULE, you specify *the best* in ultra-modern commercial lighting. It's a revelation: with just 4 simple, low-cost "building blocks of light", MITCHELL MODULE offers *unlimited* lighting patterns to custom-fit any commercial interior. MODULE'S exclusive plastic louver passes 20% MORE LIGHT. Units fit together simply (mechanically and electrically) for quick, low-cost installation, and for easy rearrangement of patterns to suit changing needs. MODULE mixes all light sources smoothly in one harmonious, beautiful system—puts the light exactly where it's needed. No ordinary fixtures can match MODULE—the *only* lighting that *custom-fits* with standard *low-cost* units.

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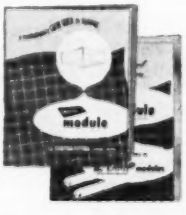

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REPAIR SPECIALISTS Gilbert Poling, president, and Martyr Ashby, electrical superintendent, Evansville Electric & Mfg. Co., discuss an electric mine locomotive rebuilding job in their Evansville, Ind., shop. Mr. Poling has been in the repair field for more than 34 years.

Eisenhardt, Treas.—Bill Hendrickson, and Secy.—Frank Schaef. Executive Committee: Ralph Kufen, Phil Desiere and Borden Hoffman. Research Committee: Borden Hoffman, Chairman; Fred Pisano, Howard Davies, Harold Hane and Dick Lehr. Program Committee: Ralph Kufen, Chairman; Joe Wagner, Tom Marino, Jr. and Albin Traceski, Jr. By-Laws Committee: Joe Previty, Chairman; Bill Engel and C. R. Durand. Membership Committee: Bill Storck, Chairman; Dick Fisher, Phil Desiere, Charlie Markle, Harry Rezer, Jerry Marcus, Art Fowler and Bill Weirich. Attendance: Joe Wagner. Publicity: Art Fowler.

Phil Desiere was named to head a special sub-committee to investigate any and all grievances.

● ● ●

Central Chapter met on September 8th at the Tower Club in Chicago. On the program for the evening was a presentation of photos and designs of "homemade" tools, gadgets or equipment which ingenious NISA members or their employees "invented" for the purpose of doing something easier-quicker-cheaper.

● ● ●

Northern California Chapter met Aug. 3 at the Athens Club in Oakland with 16 members in attendance to hear Jerry Johnson, district manager, Sterling Electric Motors, San Francisco, discuss the new NEMA frame sizes, reasons for the changes, and what they would accomplish in savings of weight and size.

● ● ●

North Central Chapter met in Duluth, Sept. 12-13 at the Hotel Duluth with registration at 9 A. M. followed

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Note above how perfectly the LPI AREALUX answers this problem! What other fixture can match this combination of features: **1.** Large area light source, extra shallow. **2.** Louvers easily removable for cleaning. **3.** Exclusive hanger device for true alignment. **4.** Completely self-contained. **5.** Fixtures easily joined endwise or sidewise, or both, for large panels of light. **6.** Top efficiency alone or in combination. **7.** Surface, suspension, or recess mounted. **8.** Shipped fully assembled for installation at minimum cost. **9.** Fully wired with E. T. L. and U. L. approved ballasts. U. L. approved and I. B. E. W.—A. F. L. Union Label.

Best of all, COMPARE THE PRICE! The LPI AREALUX is up to 20% lower in price than any and all fixtures that attempt to duplicate its exclusive combination of features. You can sell a lot of AREALUX installations to the merchants in your community.

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ENGINEERING HUDDLE on large power plant project finds C. H. Shackelford (left), field engineer and Larry Berlin, project superintendent, Emerson-Comstock Co., Inc., Chicago, checking conduit raceway details. Emerson-Comstock is the electrical contractor making the complete electrical installation.

by a business meeting, shop inspection tour, shop discussion, harbor cruise and a dinner meeting where Ed Schmidt talked on "The Story of Taconite."

● ● ●

The Southeastern Chapter will hold its annual convention on October 22-24 at the Henry Grady Hotel, Atlanta, Ga. It is the 15th annual gathering of NISA's largest chapter. T. L. Thompson, Bearden-Thompson Electric Co., Atlanta, is in charge of registration.

● ● ●

The mid-year meeting of the Board of Directors will be held in Atlanta, Oct. 24-26.

● ● ●

A total of 198 employees, representing 80 shops, are enrolled in the NISA-I.C.S. Electric Motor Repairman's Course, according to the latest report from the NISA educational and Apprentice Training Committee.

● ● ●

The following committees have been appointed for the year 1953-54:

Audit Committee—R. A. Scherer, Chairman Scherer Electric Co., Indianapolis; H. A. Lilly, Tampa Armature Works, Tampa, Fla.

Award Committee—F. M. Russell, Chairman, Russell Electric Co., Mobile, Ala.; Walter G. Brush, Electric Motor Service, Birmingham, Ala.; H. Ed. Grant, Tennessee Electric Motor Service, Nashville, Tenn.

Budget Committee—C. R. Durand, Chairman, H. N. Crowder Jr. Co., Allentown, Pa.; E. G. Potter, Lima Armature Works, Lima, Ohio; W. W. Saunders, Lenawee Electric Co., Adrian, Mich.

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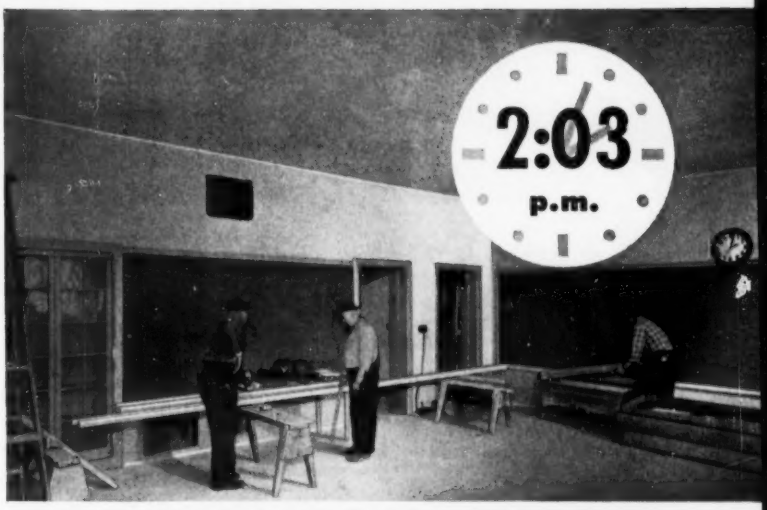

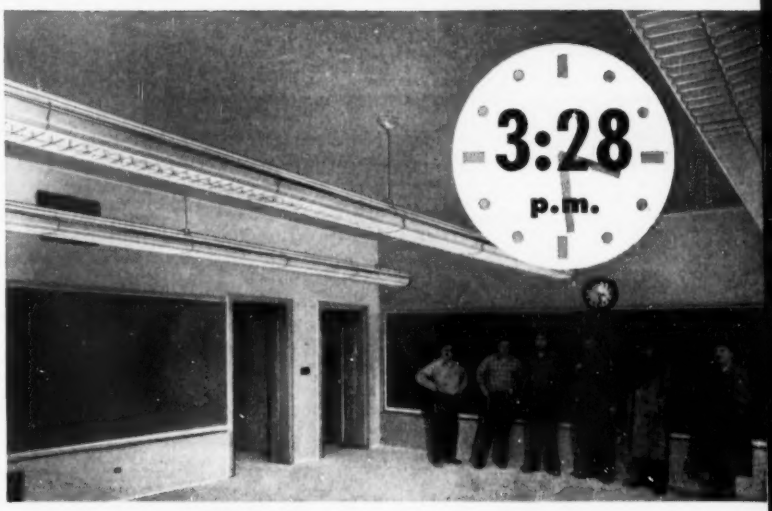

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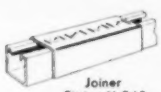
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2363382 2380379 2405631
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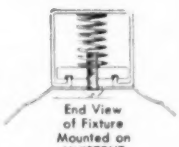
End View of Fixture Mounted on UNISTRUT Channel.

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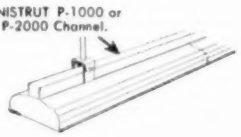

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Chapter Affairs Committee—Ed. G. Potter, Chairman, Lima Armature Works, Lima, Ohio; Murphy G. Miller, Tenn. Electric Motor Service, Knoxville, Tenn.; Alex A. Shovan, Industrial Elec. Service, Hawthorne, N. J.; Selden H. High, Sullivan Electric Co., Cincinnati, Ohio; David Sandman, Sandman Electric Motor Service, Boston, Mass.; Keith M. Noble, Pacific Electric Motor Service, Oakland, Calif.

Engineer's Advisory Committee—H. Ed. Grant, Chairman, Tenn. Electric Motor Service, Nashville, Tenn.; W. G. Brush, Elec. Motor Service, Birmingham, Ala.; O. A. Clot, Penninsular Armature Works, Miami, Fla.; W. S. Giles, Giles Armature & Elec. Works, Marion, Ill.; Ed. Jenkins, Armature Winding Co., Charlotte, N. C.; J. H. Previty, Press Electric Motor Co., Philadelphia, Pa.

The balance of committees will appear next month.

From Walter J. Prise, The Maintenance Company, New York, N. Y.

DATES AHEAD

Electrical Progress Show—Convention Hall, 34th below Spruce Sts., Philadelphia, Pa., October 13-15.

New York State Apprenticeship Council—Conference at St. George Hotel, Brooklyn, N. Y., October 28-30.

National Electrical Manufacturers Assn.—Haddon Hall Hotel, Atlantic City, N. J., November 9-12.

National Electrical Contractors Association—Annual convention, Miami Beach, Florida, November 17-20.

National Rural Electric Cooperative Assn.—National convention, Miami, Florida, Jan. 11-14, 1954.

American Institute of Electrical Engineers—Winter general meeting, New York, N. Y., January 8-12.

Plant Maintenance & Engineering Show—Exhibits International Amphitheatre, Conferences Hotel Conrad Hilton, Chicago, Ill., January 25-28.

Power and Communication Contractors Association—Ninth Annual convention, Edgewater Beach Hotel, Chicago, Ill., February 21-23.

National Electrical Manufacturers Assn.—Edgewater Beach Hotel, Chicago, Ill., March 8-11.

National Association of Electrical Distributors—Annual convention, Atlantic City, N. J., Week of June 6.


Now... set fastening studs wherever they're needed
MODEL 450 REMINGTON STUD DRIVER
Here's new economy . . . new speed in construction fastening! The Remington Stud Driver joins wood or steel sections to concrete or steel surfaces in seconds . . . easily sets as high as 5 studs a minute. Powerful 32 caliber charges drive studs arrow-straight. The tool's light weight—only 5½ pounds—simplifies handling wherever studs are needed.
New guards for specific uses now make the self-powered Remington Stud Driver more versatile than ever. These attachments take all the guesswork out of stud location . . . assure fast, accurate fastening for every job. Illustrated are just 4 of these special guards. For full information about the complete line and about the Remington Stud Driver, send the coupon below.
A complete line of guards for special applications
Guard for Structural Channel
Guard for Switch, Utility and Outlet Boxes
Guard for "Unistrut" Sections
Guard for Conduit Clips
Listed & Approved by Underwriters' Laboratories, Inc.
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Remington Arms Company, Inc.
939 Barnum Ave., Bridgeport 2, Connecticut
Please send me my free copies of the new booklets showing how I can cut my fastening costs.
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"If It's Remington—It's Right!"
Remington
DUPONT

Among the Manufacturers

Headquarters Announcements

Westinghouse Electric Corp., Lamp Division, Bloomfield, N. J.—L. J. Fitzpatrick, assistant to general manager; Charles E. Erb, merchandising manager; Robert J. Sampson, manager of sales training; Robert H. Voorhis, manager of market planning; Willard L. Adamus, staff assistant to manager of market planning; William F. Tremmel Jr., staff assistant to manager of order services and warehouse; James E. Woodall, manager of manufacturing; William J. Williams, manager of manufacturing engineering; Elwood W. Noxon, manager of northern plants; Charles T. Nichols, manager of southern plants.

Graybar Electric Co., Inc., New York—N. F. Clark, operating manager, Buffalo; A. C. Goodwin, operating manager, Syracuse; E. J. Grady, Jr., operating manager, West Hartford, Conn.; E. L. Harrelson, operating manager, Shreveport; J. M. Ferguson, manager, Davenport; R. J. Nelson, operating manager, Davenport.

General Electric Co., Pittsfield, Mass.—H. Arthur Howe, manufacturing manager, Laminated and Insulating Products Dept.

Sylvania Electric Products, Inc., New York—Charles Suttoni, Supervisor of Sales Research, Lighting Division, Salem.

Westinghouse Electric Corp., Pittsburgh, Pa.—Frank R. Benedict, staff engineering manager, Sturtevant Division, Air Conditioning Division and Bryant Electric Company; George F. Gayer, manager, Sunnyvale, California, plant; Joseph R. McGilvray, assistant to the vice-president, Sunnyvale, California, plant.

General Electric Co., Schenectady, N. Y.—A. F. Vinson, vice-president.

General Electric Co., Bloomfield, N. J.—Jack S. Beldon, manager of marketing, Air Conditioning Division.

Multi-Amp Corp., Harrison, N. J.—J. L. Wagoner, vice-president and national sales manager.

General Electric Co., Carboloy Dept., Detroit, Mich.—Charles E. St. Thomas, manager of advertising.

Electric Storage Battery Co., Philadelphia, Pa.—Roland Whitehurst, general manager, industrial products division; Robert L. Sommerville, general manager, automotive products division.

The Bristol Company, Waterbury, Conn.—F. W. Borchers, general sales manager; D. C. Sanford, manager, application engineering department.

The Falk Corporation, Milwaukee, Wis.—Franklin C. Williams, manager of sales promotion and advertising; A. H. Kelley, assistant manager of sales promotion and advertising.

Thor Corporation, Chicago, Ill.—D. R. Nighswander, assistant to the general sales manager.

Porcelain Products, Inc., Parkersburg, W. Va., announces that, in accordance with its planned program of additional facilities, modernization, and increased production, its high voltage insulators and associated hardware will henceforth be distributed nationally by Westinghouse Electric Supply Corp., of New York City.

S&C Electric Company, Chicago, Ill., announces the formation of a Canadian associate company, S&C Electric Canada, Ltd., at 8 Vansco Road, Toronto, Canada.

Moe Light, Inc., Fort Atkinson, Wis., announces its merger with the Electric Sprayit Company of Sheboygan, Wis. The new company will be known as Thomas Industries, Inc.

Regional Appointments

NEW ENGLAND

Line Material Company: Charles E. Burkett, sales engineer, covering New England and Middle Atlantic states out of New York office.

Great Western Fuse Company: Frank W. Garner, Boston, Mass., sales representative in New England States area.

MIDDLE ATLANTIC

Great Western Fuse Company: Edward L. Pritchard, Rochester, New York, and Hugh J. Crowley, Auburn, New York, sales representatives in all New York state except New York City.

SOUTH ATLANTIC

Graybar Electric Company: John J. O'Keefe, manager, appliance promotion, Richmond, Va.

EAST CENTRAL

Graybar Electric Company: E. B. Flaherty, manager, appliance promotion, Detroit, Mich.

Westinghouse Electric Corp.: F. G. Hickling, assistant to vice-president, Central District staff; E. S. Rehagen, manager, Cleveland branch office.

WEST

Westinghouse Electric Corp.: Leonard N. Goodell, district manager, Pacific Coast District.

K-S-M Products, Inc.: S. G. Kern, manager, Denver office; Robert F. Chapman, manager, San Francisco office.

Delco Products, General Motors Corp.: John E. McNeil, sales manager, Western District, with office in Los Angeles.

Advertising In This Issue

■

SEARCHLIGHT SECTION

(Classified Advertising)

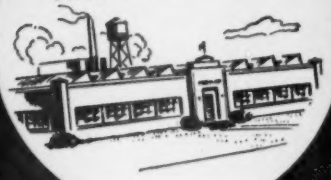
H. E. Hilty, Mgr.

3 MARKETS

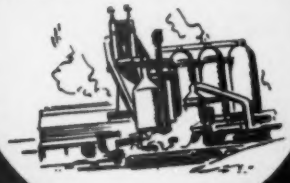
3 SWITCH LINES

1 RESIDENTIAL AND COMMERCIAL

2 COMMERCIAL AND INDUSTRIAL



3 HEAVY INDUSTRIAL



1 GENERAL USE (TYPE G)

Designed for residential and commercial applications where price is limiting and the service factor is not great.

General Purpose NEMA I

Raintight NEMA III

2 STANDARD DUTY (TYPE S)

Designed for industrial and commercial jobs where both service factor and price are important. Meets requirements for Type A switches.

General Purpose NEMA I

Raintight NEMA III

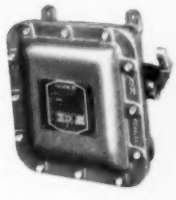
3 HEAVY DUTY (TYPE H)

Designed for mass production industries where price is secondary to continuous performance and maximum safety under severe service.

General Purpose NEMA I

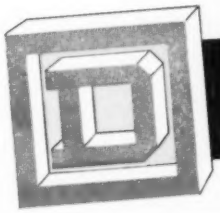
Special Industry NEMA XII

Water-tight; Dust-tight NEMA IV, V



Explosion Resisting NEMA VII, IX

ASK YOUR ELECTRICAL DISTRIBUTOR FOR SQUARE D PRODUCTS



SQUARE D COMPANY

1903 · 50 YEARS OF DESIGN LEADERSHIP · 1953

The smooth, blue interior finish of the new G-E WHITE rigid steel conduit makes fishing and wire-pulling easy.

Easy fishing and wire-pulling with new G-E WHITE rigid conduit

The new G-E WHITE rigid steel conduit is lined with a new corrosion-resistant coating, containing a special antifriction agent. This smooth, blue interior surface lets wires slide easily, and cuts fishing and wire-pulling time.

New G-E WHITE also offers easy bending and improved corrosion protection because it is zinc galvanized by the "metallizing" process. This process bonds a uniform coating of pure zinc to the entire outside surface of the conduit, including threads.

New G-E WHITE metallized conduit, with its completely new interior and exterior finishes, is listed by Underwriters' Laboratories, Inc. Ask your distributor about it, or write Section C35A-1018, Construction Materials Division, General Electric Company, Bridgeport 2, Connecticut.

You can put your confidence in—

GENERAL ELECTRIC